WESTON SOLUTIONS, INC.

APRIL-MAY 2005 SITE INVESTIGATION REPORT AND FOCUSED FEASIBILITY STUDY

SAINT CLAIR SHORES DRAIN SITE ST. CLAIR SHORES, MACOMB COUNTY, MICHIGAN

Volume I of II

WESTON SOLUTIONS

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AND
FOCUSED FEASIBILITY STUDY

SAINT CLAIR SHORES DRAIN SITE
ST. CLAIR SHORES, MACOMB COUNTY, MICHIGAN

Volume I of II

Prepared for:

MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY
REMEDIATION AND REDEVELOPMENT DIVISION

Prepared by:

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Okemos, Michigan 48864

October 2005

W.O. No: 20083.066.001

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EXECUTIVE SUMMARY

In accordance with a Michigan Department of Environmental Quality (MDEQ) and United States Environmental Protection Agency (USEPA) request, Weston Solutions of Michigan, Inc. (WESTON®) has performed multiple tasks in support of the April-May 2005 Ten Mile Drain (TMD) Site Investigation (SI) and Focused Feasibility Study (FFS) in St. Clair Shores (SCS), Michigan.

The primary objectives of the SI were to further characterize the nature and extent of poly-chlorinated biphenyl (PCB) contamination through the identification of hot spots/source areas adjacent to the TMD utility corridor, to identify migration pathways into or out of the TMD utility corridor/concrete piping, and allow the completion of a FFS based on site conditions and the SI findings to date.

During April and May 2005, the MDEQ and USEPA advanced 76 Geoprobe soil borings for the collection of soil and groundwater samples at suspected continuing PCB source areas and other TMD locations. Three residential sump system water samples also were collected to determine additional human health risks at the TMD Site. The April-May 2005 TMD study area included Harper Avenue to the west, Bon Heur Avenue to the north, B Street to the east, and Madison Avenue to the south.

PCBs were detected in 133 soil samples collected at 76 Geoprobe soil boring locations within the study area during April and May 2005. PCB concentrations exceeded the Toxic Substances Control Act (TSCA) Waste Characterization Standard of 50 ppm at five soil boring locations adjacent to the TMD utility corridor within the April-May 2005 study area. Analytical results indicate the presence of PCBs in site soils at 21 Geoprobe soil boring locations at concentrations exceeding the MDEQ Direct Contact criteria of 4 ppm at depths ranging from 0-6 feet below grade. PCBs were detected in clayey and sandy native soils at depths ranging from one to 20 feet bgs at varying locations throughout the study area. PCBs also are present within the fill materials of the TMD utility corridor primarily along Bon Brae Avenue between Harper Avenue and E Street. Analytical results also indicated the presence of PCBs in one of three sump system water samples at a concentration of 0.00025 ppm.

Based on a comparison of the April-May 2005 SI results to the findings from ongoing TMD sediment monitoring activities, a significant source area outside the TMD utility corridor has not been determined.

Based on the SI results, the media to be addressed are the subsurface soils within the TMD utility corridor located in the vicinity of the intersection of Bon Brae Avenue and Harper Avenue, and surface soils in the vicinity of borings SCS-017, SCS-016, and SCS-030.

WESTON evaluated five remedial alternatives for the TMD Site based on effectiveness, implementability, and cost while protecting human health and the environment. Pending MDEQ and USEPA concurrence, WESTON recommends the implementation of Remedial Alternative 2; Excavation of surface soils containing PCBs at concentrations exceeding MDEQ Part 201 Generic Residential Direct Contact (DC) criteria, and restoration (primarily sealing) of the TMD concrete piping, manholes, and junction box.

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SECTION 1

INTRODUCTION

Weston Solutions of Michigan, Inc. (WESTON®) has prepared this Site Investigation (SI) Report and Focused Feasibility Study (FFS) to summarize the findings of the source area SI conducted by the Michigan Department of Environmental Quality (MDEQ) and the United States Environmental Protection Agency (USEPA) for the Ten Mile Drain/Saint Clair Shores Drain (SCSD) Site located in Saint Clair Shores (SCS), Macomb County, Michigan. During April-May 2005 WESTON prepared a comprehensive Work Plan for source area investigation activities to be implemented by the USEPA and the MDEQ. Data gathering efforts completed by USEPA and MDEQ were intended to provide an expedited assessment of primary PCB sources/impacts, and to implement the appropriate remedial action(s). Based on the results of SI activities, WESTON completed a FFS based on source area investigation findings and additional site historical data. WESTON conducted these activities under the Level of Effort (LOE) Contract between WESTON and the State of Michigan (Contract No. 2002) and the Superfund Technical Assessment and Response Team (START) Contract between WESTON and the USEPA.

1.1 SITE SETTING AND HISTORY

1.1.1 Site Setting

The SCSD Site is located in a mixed residential/commercial area in SCS, Macomb County, Michigan, near the shores of Lake St. Clair (**Figure 1**). SI activities to date have focused primarily on the SCSD utility corridor comprised of an enclosed concrete storm sewer system surrounded by sand and gravel fill materials placed in native clay soils. The SCSD drains approximately 307 acres (0.5 square mile) of SCS, terminating with a 102-inch diameter outlet structure located at the Lange Street Canals, which flow into Lake St. Clair. The April-May 2005 SCSD study area included Harper Avenue to the west, Bon Heur Avenue to the north, B Street to the east, and Madison Avenue to the south. For the purposes of this report, the

following terms and definitions will be used to reference different components of the SCSD system:

- SCSD utility corridor; refers to the primary drain system (not the secondary and tertiary storm drains) including the trench in which the concrete piping was installed, backfill placed around the piping, and the buried concrete piping.
- SCSD concrete piping; refers to the engineered concrete piping buried within the SCSD utility corridor.
- SCSD drainage system; refers to the entire drainage system, including primary, secondary, and tertiary drainage components of the SCSD managed by Macomb County Public Works Office (MCPWO) and SCS.

1.1.2 Site History

During 2001, the MCPWO collected sediment samples from the Lange Street Canals in support of their efforts to secure a dredging permit. A review of laboratory analytical results by the MDEQ and the United States Army Corps of Engineers (USACE) indicated the presence of polychlorinated biphenyls (PCBs) at concentrations up to 150 parts per million (ppm) within canal sediments near the SCSD outlet structure. As a result, the MDEQ and MCPWO initiated an investigation of the SCSD utility corridor during February 2002. Laboratory analytical results indicated the presence of PCBs exceeding the Toxic Substances Control Act (TSCA) Waste Characterization Level for soil/sediment (50 ppm) and the MDEQ Part 201 Groundwater/Surface Water Interface (GSI) Criteria (0.0002 ppm) in samples collected from various locations within the SCSD concrete piping. The highest concentration of PCBs (3,270 ppm) was detected within the SCSD concrete piping at the intersection of Harper Avenue and Bon Brae Avenue.

During March 2002 the USEPA Emergency Response Branch launched efforts in support of the MDEQ and MCPWO to characterize the nature and extent of PCB contamination in the SCSD utility corridor and the Lange Street Canals. Laboratory analytical results from sediment samples collected by USEPA in the SCSD concrete piping indicated the presence of PCBs at a

maximum concentration of 121.000 ppm at manhole location M4335 near the intersection of Bon Brae Avenue and E Street. PCBs also were detected in Lange Street Canal sediment core samples collected near the SCSD outlet.

Based on the results of these SI activities, the USEPA initiated sediment removal and dewatering activities during 2002 in areas of the SCSD concrete piping exhibiting the highest levels of PCB contamination. The USEPA and its contractors conducted vacuuming and power jetting of approximately 1 ¼ miles of the SCSD concrete piping from Lakeland Boulevard to Bon Brae Avenue and from Harper Avenue to the SCSD outlet structure at the Lange Street Canals.

Concurrent with USEPA removal actions, the MCPWO and its contractors conducted sediment removal and dewatering activities along 4 ¼ miles of the remaining 5 ¾ miles of the SCSD concrete piping in the project area and installed steel plates near the SCSD outlet structure to serve as a trap in order to prevent the additional discharge of PCB contaminated sediments to the canal.

SCS, MCPWO and their contractors have conducted subsequent quarterly monitoring activities of water and sediments within the SCSD concrete piping. Monitoring efforts during 2003-2004 revealed the renewed presence of PCB contaminated sediment and water within the SCSD drainage system; therefore, the MDEQ, USEPA, MCPWO, and SCS have coordinated efforts to identify potential source areas and investigate potential migration pathways into or out of the SCSD utility corridor.

During 4-5 April 2005, the MDEQ initiated a source area investigation at the SCSD Site, advancing Geoprobe soil borings at 13 locations adjacent to the SCSD utility corridor along Bon Brae Avenue, Lakeland Boulevard, and Harper Avenue. As summarized in **Table 1**, laboratory analytical results indicated the presence of PCBs in soil at the following locations during April 2005:

- MSB-1 and MSB-2 located west of the intersection of Bon Brae Avenue and Harper Avenue.

- MSB-4 located along the south side of Bon Brae Avenue at the BP Gas Station.
- MSB-7, MSB-9, MSB-10, MSB-11, and MSB-12 located near the intersection of Harper Avenue and Lakeland Boulevard at the JM Olson Corporation Property (former tool & dye facility).
- MSB-13 located at 21725 Bon Brae Avenue.

Figure 2 presents analytical results from the April 2005 MDEQ Geoprobe sampling activities. Stratigraphic boring logs for MDEQ soil borings MSB-1 through MSB-13 are included in **Appendix A.**

During May 2005, the USEPA and MDEQ advanced 64 additional Geoprobe soil borings at suspected source area locations, at areas adjacent to the SCSD utility corridor along Bon Brae Avenue and Harper Avenue, and at locations along the open drain. USEPA and MDEQ May 2005 Geoprobe soil boring locations are illustrated on **Figure 3.**

1.2 PROJECT OBJECTIVES

The primary objectives of the April-May 2005 SI were to further characterize the nature and extent of PCB contamination through the identification of hot spots/source areas adjacent to the SCSD utility corridor, to identify migration pathways into or out of the SCSD utility corridor/concrete piping, and allow the completion of an FFS based on site conditions and the SI findings to date.

SECTION 2

INVESTIGATION ACTIVITIES

SI activities and field procedures implemented by the MDEQ and USEPA were generally completed in accordance with WESTON's May 2005 *Work Plan For Source Area Investigation Activities At The Ten Mile Drain Site Macomb County, Michigan,* with some modifications.

2.1 GEOPROBE INVESTIGATION

May 2005 SI activities implemented by the USEPA and the MDEQ included the advancement of 64 soil borings at various potential source area locations and structures to varying depths. Soil borings were advanced to depths equivalent with the topsoil-clay interface or to the base of utility corridor trenches based on boring locations relative to source areas/structures. These borings were advanced for the purpose of locating and delineating potential source(s) and migration pathways of PCBs at areas within and adjacent to the SCSD utility corridor. Source area soil boring locations are shown on **Figure 3**.

2.1.1 Soil Sample Collection

Soil samples were collected using a 4-foot macro-core sampler, from the ground surface to end depths ranging from eight to 20 feet below ground surface (bgs) corresponding to the base of the SCSD utility corridor or appropriate interval based on field observations and boring locations relative to specific structures and/or potential source areas. All soil samples were field screened for the presence of volatile organic compounds (VOCs) using a photo-ionization detector (PID). Soil classification information and other field observations were recorded on geologic boring logs by USEPA and MDEQ personnel. Based on available information, area soils are primarily composed of dry to moist clay soils with inter-bedded sand and silt seams. Clay soils exhibiting staining, desiccation marks and/or fractures were preferentially selected for laboratory analysis. Emphasis was placed on the inspection, identification, and documentation of these features in

clay soils. Select soil samples from each Geoprobe boring location were submitted to Envirosystems for PCB analysis. Soil samples were collected at select locations and submitted to Envirosystems for VOC analysis to aid in source area location efforts. Additional soil samples were sent to the MDEQ Laboratory for PCB and VOC analysis. All soil samples were shipped as Dangerous Goods in accordance with International Air Transport Association (IATA) regulations. Results of soil sampling activities are discussed in **Section 3**.

2.1.2 Vertical Aquifer Sampling

In order to determine the presence and nature of groundwater contamination, vertical aquifer sampling (VAS) was conducted at select Geoprobe boring locations where groundwater was encountered. Groundwater samples were collected utilizing a SP-16 screen-point sampler. Once the attachment was driven to the desired water-bearing hydrostratigraphic unit (as determined during soil collection activities), groundwater was purged using disposable poly tubing and a peristaltic pump. During purging, field readings of pH, conductivity, and temperature were recorded. Once these field parameters stabilized, groundwater samples were collected and submitted to Liberty Analytical for PCB analysis. Select water samples also were submitted for VOC analysis. All groundwater samples were shipped as Dangerous Goods according to IATA regulations. Results of VAS activities are presented in **Section 3**.

2.2 RESIDENTIAL SUMP SYSTEM SAMPLING

Based on the potential for hydraulic communication to exist between the SCSD utility corridor and the open drain utility, and the subsequent potential for PCB migration into residential sump systems, the USEPA and MDEQ collected sump system water samples for PCB analysis from three area residences. Sump system samples were identified as follows:

- SUMPPUMP-1
- SUMPPUMP-2
- SUMPPUMP-3

Results of residential sump system sampling activities are presented in **Section 3.**

2.3 GEOPHYSICAL SURVEY

During May 2005 the MDEQ conducted electromagnetic (EM) and ground penetrating radar (GPR) surveys to delineate the extent and dimensions of the open drain utility. The EM and GPR surveys occurred over accessible spans of the open drain utility also know as the Martin Drain. Results of the EM and GPR surveys conducted by the MDEQ are summarized in a letter report entitled *"10 Mile and Martin Drain, Macomb County, MERA #500736, GPR and EM Surveys"* **(Appendix B).**

2.4 GLOBAL POSITIONING SYSTEM SURVEY OF BORING LOCATIONS

Upon completion of Geoprobe soil boring activities, MDEQ and USEPA personnel conducted a Global Positioning System (GPS) survey of Geoprobe soil boring locations. GPS equipment capable of sub-meter accuracy was utilized for coordinate determination and establishing the boring locations with respect to northing and easting state plane coordinates. GPS coordinates were not recorded for Geoprobe boring locations 010, 012, 061 and 063; therefore, these locations were plotted on maps based on information obtained from MDEQ/USEPA field notes. GPS coordinates were not recorded for Geoprobe locations 066, 069, and 077. These locations apparently were not recorded in USEPA or MDEQ field notes and therefore, these locations are not included in boring location illustrations.

2.5 DECONTAMINATION

All sampling and downhole equipment was decontaminated prior to each use. Decontamination methods for sampling equipment consisted of an Alconox detergent wash, followed by a potable water rinse. All drilling equipment and tooling was decontaminated using a steam pressure washer over a tub. All water collected during decontamination was placed in a 55-gallon drum and staged onsite.

2.6 INVESTIGATION DERIVED WASTE

All investigation derived waste (IDW), including soil cuttings, purge water, and decontamination water, was containerized in 55-gallon drums pending characterization and disposal. Drums containing soil cuttings and purge/decontamination water were temporarily staged on site.

SECTION 3

INVESTIGATION RESULTS

3.1 HYDROGEOLOGY

3.1.1 Site Stratigraphy

Available area stratigraphic information indicates the primary presence of fine grained deposits with interbedded lenses of coarser grained materials comprising the native soils surrounding the SCSD utility corridor within the study area. Based on boring log information and an evaluation of subsurface structures, geologic materials within the study area are comprised of sand, clay, silty clay, sandy clay, and clayey sand zones extending to a depth of approximately 15 feet bgs. In general, the SCSD utility corridor is set within the native clay soils and is comprised of an enclosed concrete storm sewer system set within fill materials of varying composition.

Stratigraphic boring logs for MDEQ soil borings MSB-1 through MSB-13 and SCS-030 through SCS-051, and USEPA soil borings SCS-001 through SCS-029 and SCS-060 through SCS-085 are included as **Appendix A**.

3.1.2 Hydrogeologic Conditions

Groundwater was encountered at varying depths/locations during April-May 2005 soil boring activities; however, the hydrogeologic setting of the study area remains largely uncharacterized. Available information indicates that hydrogeologic materials are comprised of fine grained aquitard materials with poorly connected, interbedded water bearing coarse grained units encountered at varying depths.

3.1.3 Groundwater Flow

The occurrence and movement of groundwater within native soils at the site is largely uncharacterized. Based on available data it is assumed that no substantial aquifer exists within the upper 20 feet within the study area. Available data indicates that groundwater (where present) migrates to and from the SCSD corridor via fractures/void spaces in clayey units, interbedded sand seams, and adjacent utility corridors. Surface water runoff in the study area is collected via storm sewers and catch basins that are associated with the SCSD drainage system. Based on available information obtained from monitor wells set within the SCSD utility corridor it appears that groundwater is transmitted primarily through fill materials surrounding the SCSD concrete piping.

3.2 SOIL ANALYTICAL RESULTS

A biased sampling strategy was selected to explore for PCB sources based on the following specific biases at the SCSD site:

- Reported and suspected source area locations.
- Stained soils.
- Preferential pathways for contaminant migration and changes in soil characteristics (fractured clays, sand seams, utility corridors).

A series of visual and screening level soil measurements were implemented in the field at each boring location in order to determine soil and groundwater water sample collection for laboratory analysis.

Soil analytical results for PCBs above 10 ppm from the May 2005 USEPA and MDEQ SI are presented on **Figure 4**. Boring locations where PCB concentrations in soil exceed the MDEQ Direct Contact (DC) Criteria of 4 ppm are presented on **Figure 5**. Detected levels of PCBs at all locations/depths are presented on **Figure 6**. **Table 2** summarizes the PCB analytical results for the soil sampling portion of the May 2005 Geoprobe investigation. **Table 3** summarizes the VOC analytical results for soil samples collected during the May 2005 Geoprobe investigation. VOCs are compared to applicable Part 201 criteria including GSI Protection Criteria, Soil Volatilization to Indoor Air (SVIA) Criteria, and Groundwater Gontact (GC) Protection Criteria.

Copies of the laboratory soil analytical results are included as **Appendix C in Volume II of II.**

3.2.1 PCBs In Soil

Laboratory analytical results indicate that PCBs were detected in 21 soil samples collected at 12 Geoprobe soil boring locations during April 2005. PCBs were detected in 112 soil samples collected at 64 Geoprobe soil boring locations within the study area during May 2005. Total PCB concentrations exceeded the TSCA Waste Characterization Standard of 50 ppm at five soil boring locations adjacent to the SCSD utility corridor including; MSB-1 (8-9 feet bgs) at a concentration of 100 ppm, MSB-12 (8-8.5 feet bgs) at a concentration of 52 ppm, SCS-001 (9-12 feet bgs) at a concentration of 1,125 ppm, SCS-022-023 (0-1 feet bgs) at a concentration of 31,820 ppm, and SCS-025 (12-15 feet bgs) at a concentration of 152.9 ppm. PCBs also were detected at a concentration of 822 ppm at soil boring SCS-017 (1-3 feet bgs) located on the eastern portion of the J.M Olsen, Inc. property.

Analytical results indicate the presence of PCBs in site soils at 21 Geoprobe soil boring locations at concentrations exceeding the MDEQ DC criteria of 4 ppm at depths ranging from 0-6 feet bgs.

Figure 7 shows the traces of two cross-sections (A-A' and B-B') constructed to evaluate the distribution of PCBs in soils adjacent to the SCSD utility corridor. Cross-sections were constructed using available analytical and stratigraphic information.

Cross-Section A-A' (**Figure 8**) is located along Bon Brae Avenue and trends from the west to east. This cross-section is parallel to stormwater flow within the main SCSD utility corridor.

Cross-Section B-B' (**Figure 9**) is located along Harper Avenue and trends from the north to south. This cross-section bisects the primary axis of the SCSD main at Bon Brae Avenue and is parallel to stormwater flow within the SCSD section along Bon Brae Avenue.

PCBs were detected in clayey and sandy native soils at depths ranging from one to 20 feet bgs at varying locations throughout the study area. PCBs also are present within the fill materials of

the SCSD utility corridor primarily along Bon Brae Avenue between Harper Avenue and E Street.

3.2.2 VOCs In Soil

Seven soil samples obtained at five Geoprobe boring locations were submitted for VOC analysis during the May 2005 field effort. Acetone, a common laboratory contaminant was detected below the quantitation limit at a concentration of 0.009 ppm in soil sample SCS-047. No other VOCs were detected above quantitation limits in any of the other six VOC soil samples submitted for laboratory analysis.

3.3 GROUNDWATER ANALYTICAL RESULTS

VAS groundwater samples were collected for VOC and PCB analysis at five Geoprobe soil boring locations during the May 2005 Geoprobe investigation. PCBs and VOCs are compared to applicable Part 201 criteria including GSI, GVIA, and GC Criteria. **Appendix C** presents laboratory analytical reports. PCB groundwater analytical results are summarized in **Table 4**. VOC groundwater analytical results are summarized in **Table 5**.

3.3.1 PCBs In Groundwater

PCBs were detected in groundwater samples collected at soil boring locations SCS-022, SCS-022-023, and SCS-025 adjacent to the SCSD utility corridor along Harper Avenue and Bon Brae Avenue, and SCS-041 adjacent to the water main utility along Harper Avenue. All PCB concentrations exceeded the Part 201 GSI, GVIA and GC criteria with the exception of the sample from SCS-022, which only exceeded the GVIA and GC criteria.

3.3.2 VOCs In Groundwater

VAS groundwater analytical results indicate that VOCs were not detected in any groundwater samples at concentrations exceeding their respective quantitation limits with the exception of

acetone and chloroform. Both acetone and chloroform were below the Part 201 GSI, GVIA, and GC Criteria.

3.3.3 Sump System Sampling Results

The USEPA and MDEQ collected sump system water samples for PCB analysis from three area residences based on resident reports of flooding and frequent sump system operation. Sump system samples were identified as SCS-SUMPPUMP-1, SCS-SUMPPUMP-2, SCS-SUMPPUMP-3. PCBs were not detected in residential sump system samples SCS-SUMPPUMP-1 or SCS-SUMPPUMP-3. Analytical results did however indicate the presence of PCBs in water sample SCS-SUMPPUMP-2 at a concentration of 0.00025 ppm.

SECTION 4

FOCUSED FEASIBILITY STUDY

4.1 INTRODUCTION

This FFS presents the identification, screening, evaluation, and selection of available remedial technologies and process options for the SCSD Site. The development of remedial alternatives consisted of the following activities:

- Definition of remedial action objectives (RAOs) to address PCB contamination at the SCSD Site.
- Identification of general response actions to meet those objectives.
- Identification and screening of process options and remedial technologies that could achieve the response actions.
- Assembling the process options/technologies into suitable remedial alternatives.

The remedial alternatives were then evaluated on the basis of the effectiveness of the alternative to protect human health and the environment; the technical and administrative implementability; and the capital and operation and maintenance cost.

4.2 DEVELOPMENT OF REMEDIAL ACTION OBJECTIVES

RAOs are designed to protect human health and the environment by reducing contaminant concentrations and exposure to the affected media. Based on the SI results, the media to be addressed are the subsurface soils located in the vicinity of the intersection of Bon Brae Avenue and Harper Avenue, and surface soils in the vicinity of borings SCS-017, SCS-016, and SCS-030. The subsurface soils in the vicinity of Bon Brae Avenue and Harper Avenue are believed to be acting as a source of sediment contamination in the SCSD utility corridor. At this intersection, three boring locations (SCS-001, SCS-022-023, and SCS-025) that contained PCBs greater than the TSCA Waste Characterization Level of 50 ppm. The surface soils located in the vicinity of borings SCS-017, SCS-016, and SCS-030 contain PCBs at concentrations greater than the MDEQ Part 201 Residential and Commercial I DC criteria of 4 ppm.

The USEPA and MDEQ have defined the RAOs for this FFS as follows:

- Protect human health and the environment by preventing the migration of PCB contaminated soils with PCB concentrations greater than the USEPA Waste Characterization Level of 50 ppm.

- Protect human health and the environment by preventing direct contact with PCB contaminated soils containing concentrations greater than the MDEQ Part 201 Residential and Commercial DC Criteria of 4 ppm.

4.3 GENERAL RESPONSE ACTIONS

General response actions denote those actions that will satisfy the RAOs described above. The general response actions presented below are considered appropriate for remediation of the identified contamination at the SCSD Site. Six general response actions identified for the remediation of contaminated soil at the SCSD Site are listed below:

- No Action.
- Institutional Controls.
- Containment.
- Collection.
- Treatment.
- Disposal.

4.4 IDENTIFICATION OF REMEDIAL TECHNOLOGIES AND PROCESS OPTIONS

Remedial technologies are defined as general categories of technologies, such as physical/chemical treatment or mechanical extraction. Process options refer to specific processes within each technology. The list of technologies and process options identified for consideration at the SCSD Site are presented in **Table 6**. The list was developed based on site-specific conditions, the chemical of concern (PCBs), technical references, and WESTON's experience with similar sites. The technologies identified were screened to narrow the list of potential technologies included for development of the remedial alternatives. Identified remedial technologies and process options were screened against the implementability of the technology, the SCSD Site conditions, and waste characteristics.

4.5 DEVELOPMENT OF ALTERNATIVES

This section describes how the retained remedial technologies and process options were assembled into alternatives that address contamination at the SCSD Site. Descriptions of the technical components of each alternative are provided. The alternatives were then evaluated based on effectiveness, implementability, and cost.

Alternative 1: No Action

The No Action alternative is retained because it provides a baseline for comparison with other alternatives. This alternative implies that no remedial action would be undertaken at the SCSD Site; therefore, the potential human health and environmental risks associated with exposure to contaminants would not be mitigated and contamination of the SCSD corridor would likely continue.

Alternative 2: Limited Excavation/Offsite Soil Disposal and Storm Sewer Restoration

This alternative involves the following components:

- Excavation of the contaminated surface soil from 0 to 3 feet bgs located near boring SCS-017, SCS-016, and SCS-030.
- Restoration (i.e. sealing) of the existing storm sewer system at select locations.

Excavation

Soils located near boring SCS-017 contained total PCB concentrations of 822 ppm at 0 to 3 feet bgs, exceeding the MDEQ Part 201 Residential and Commerical I DC criteria. For the purpose of developing this alternative it was assumed that PCB concentrations greater than DC criteria are present to a depth of 3 feet bgs. Eliminating direct contact hazards could be achieved by removing only the soils located six inches below grade and placing a cap over the remaining soils. However, because the majority of the MDEQ Part 201 Residential and Commercial I DC exceedences are located on private property, maintenance of the cap would be difficult to enforce. Thus, it was assumed that all soils greater than MDEQ Part 201 Residential and Commercial I DC Criteria from 0-3 feet bgs would be removed and disposed offsite. Soils

containing total PCBs concentrations greater than 50 ppm require disposal at a landfill capable of accepting TSCA waste. The closest landfill capable of accepting TSCA waste is the Wayne Disposal Inc. (Wayne Disposal) Landfill located in Bellville, MI. Soils with concentrations less than 50 ppm will be disposed at a Type II landfill. Two additional soil borings are located in the vicinity of SCS-017 and both contain concentrations of PCBs less than 50 ppm. Using the limited analytical data available the actual quantity of soil requiring removal is difficult to determine and additional soil sampling will be required during the implementation of this alternative to further define the extent of contamination. For the purpose of developing this alternative, it was assumed an area of approximately 7,500 square feet would require removal to 3 feet bgs (equating to approximately 830 cubic yards). It was assumed that 75% of the soil excavated near SCS-017 would require disposal as a TSCA waste.

Borings SCS-016 and SCS-030 contained total PCB concentrations of 8.85 ppm and 4.6 ppm respectively, greater than the MDEQ Part 201 Residential and Commercial I DC Criteria. Additional sampling near these boring locations will also be required to further define the extent of contamination. For the purpose of developing this alternative, it was assumed that a 50 foot radius around each boring location would require removal. As in the soils located in the vicinity of SCS-017, it was assumed that soils to a 3 foot depth would be removed and disposed offsite. It was assumed that none of the contaminated soils would require disposal as a TSCA waste. Verification samples would be performed on each excavation to ensure that contaminants above the cleanup criteria have been removed.

Sewer Restoration

Alternative 2 will include the restoration of the SCSD sewer, manholes, and the associated junction box. A liner would be placed in the existing piping and chemical grouting would be installed in the manholes and junction box to seal cracks and breaks in order to prevent groundwater and sediment intrusion. For the purpose of developing this alternative, it was assumed that cured in-place polyester felt liner would be installed in the piping and chemical grouting will be performed in the manholes and junction box. Specific product and material

thickness to be used for the storm drain restoration would require evaluation during the design phase of the remediation.

It was assumed that the existing storm drain piping would be lined from manhole M7178 to manhole M4281 and from the junction box to manhole M4262. Also, the piping from the catch basins located on the northeast and southwest corners of Bon Brae Avenue and Harper Avenue would be lined. The soft liner would be inserted into the pipeline from one existing manhole to another. The liner is then expanded to press tightly against the existing piping. Once in place, the liner is heated to activate the resin which causes the liner to cure in place.

Prior to installation of the liner, the pipe runs would be dewatered and cleaned of all debris and sediments. It was assumed based on current sample results from inside the sewer pipe that the debris and sediments would be a TSCA waste and would be disposed at Wayne Disposal, Inc. The lids on each of the manholes and junction box are reportedly 22-inches in diameter and the manholes are constructed of concrete block. To install the liner, the manholes will need to be excavated and partially dismantled to allow enough room for workers and equipment for liner installation. The most practical location to install the liner would be at the junction box; however, to avoid excavation in the most heavily contaminated area and to avoid traffic congestion while working near the junction box, it was assumed that SCSD storm water sewer pipe would be accessed at manholes M7173 and M4281. The concrete pavement and asphalt pavement near manholes M7173 and M4281 will be saw cut and removed. An approximate 10 foot by 10 foot excavation to an approximate depth of 5 feet bgs would be excavated. The excavated soils would be sampled and disposed at an offsite landfill. Based on sample results from soils in these areas, it was assumed for the purpose of developing this alternative the soil would not be a TSCA waste and could be disposed in a Type II landfill. Once access is made to the manholes, the liner would be installed in the pipes between the manholes. After installation the manholes would be reconstructed to their original dimensions, the excavation would be backfilled, and the roadways replaced.

It was assumed in developing this alternative that manholes M7178, M7179, M4262, and M4281 and the junction box located at the intersection Harper Avenue and Bon Brae Avenue would

require rehabilitation. A chemical grout would be installed from the interior of the structures to provide a positive side seal on the exterior. In addition, a half-inch calcium aluminate cement mortar would be installed on the interior of the structures to provide a negative side seal.

Alternative 3: Limited Excavation/Offsite Soil Disposal and Hydraulic Containment

Alternative 3 involves the following components:

- Excavation of the contaminated surface soil located near boring SCS-017, SCS-016, and SCS-030.
- Installation of extraction wells to provide hydraulic containment of the groundwater in the vicinity of the source area.

Excavation

Alternative 3 will involve the excavation of contaminated surface soils near borings SCS-017, SCS-016, and SCS-030 as described in Alternative 2.

Hydraulic Containment

Alternative 3 will also include the installation of groundwater extraction wells to hydraulically contain the shallow groundwater in the vicinity of the SCSD corridor from manholes M7178 to M4281 and from the junction box to manhole M4262. Due to the hydrophobic nature of PCBs, the extraction wells would not be installed to actively remediate the source areas. Instead, the extraction wells would be pumped at a rate necessary to mitigate migration of the source area contaminants and prevent the flow of the contaminants into the corridor. The extracted groundwater will then be treated at an onsite groundwater treatment system. Treated water will be discharged to the onsite sanitary or storm sewer system. Monitoring wells will also be installed to verify the cone of depression around the extraction wells and to determine if contaminants are migrating past the containment area.

The number, size, depths, pumping rates, and locations of the groundwater extraction wells, and the size and components of the groundwater treatment system will be determined during the remedial design. For the purpose of developing this alternative, it was assumed that four

extraction wells and six monitoring wells will be installed in the vicinity of the Bon Brae Avenue and Harper Avenue intersection. The groundwater treatment system was assumed to consist of two 500 pound granulated carbon adsorption (GAC) vessels to treat a combined pumping rate of 20 gallons per minute. Pretreatment components such as the addition of chlorine and sequestering agents to control biofouling may be also required and will be determined during the design phase. It was assumed that the groundwater treatment system would be installed in the parking lot located in the southeast intersection of Bon Brae Avenue and Harper Avenue. Underground piping from each of the extraction wells to the groundwater treatment system and discharge piping from the treatment system to the local sewer system will also be installed. The treatment system will consist of a prefabricated structure to reduce noise, improve appearance, insulate the treatment processes, and protect equipment. A six foot high security fence will be constructed around the treatment building to limit accessibility to the facility and the potential for public exposure. Power lines would be connected and wiring would be installed to operate pumps, fans, lighting and treatment equipment. A National Pollutant Discharge Elimination System (NPDES) permit obtained from the MDEQ and building permits obtained from SCS may be required.

Operation and maintenance (O&M) and groundwater monitoring will be required throughout the containment system operation. The O&M would include regular inspections of the treatment system to record flow rates, carbon change outs, and flow meter cleaning pumps, and groundwater sampling and reporting. It was assumed for the purpose of developing this alternative that O&M would occur over a 30 year period.

Alternative 4: Expanded Excavation/Offsite Disposal and Storm Sewer Restoration

This alternative would involve the following components:

- Excavation of the contaminated surface soil located near boring SCS-017, SCS-016, and SCS-030.
- Restoration of the existing storm sewer system.
- Excavation of contaminated subsurface soils located in the utility corridor.

Alternative 4 will involve the excavation of contaminated surface soils near borings SCS-017, SCS-016, and SCS-030 as described in Alternative 2. and would also consist of excavating contaminated subsurface soils at the intersection of Harper Avenue and Bon Brae Avenue (from manholes M7178 to M4281 and from the junction box to manhole M4262) where PCBs were detected at concentrations greater than the TSCA Waste Characterization Level of 50 ppm. Per the USEPA, it was assumed that contaminated soils containing concentrations greater than 10 ppm would be removed. The soil would be removed and transported off-site to a landfill for disposal.

Storm Sewer Restoration

To ensure that remaining soils would not infiltrate into the storm sewer, the sewer would be restored as described in Alternative 2.

Excavation

The excavation is expected to proceed to a maximum depth of approximately 25 feet bgs. Portions of the Harper Avenue and Bon Brae Avenue will require removal and offsite disposal of the asphalt and concrete. To minimize side sloping of the excavation and groundwater infiltration, and to enhance worker protection, selective shoring will be required. It was assumed shoring would be required from the junction box to manhole M7179 and approximately 75 west of manhole M7179; from the junction box east along Bon Brae Avenue approximately 90 feet; and, to the south of the junction box along Harper Avenue approximately 75 feet. Areas where groundwater is encountered will require dewatering. Dewatering of the excavation would be performed utilizing a vacuum truck. For the purpose of developing this alternative, it was assumed that approximately 30,000 gallons of groundwater will be removed and treated off-site. The actual volume of groundwater removed will be dependent upon subsurface and weather conditions at the time of excavation.

Excavation will be conducted utilizing standard construction equipment (excavators, dump trucks, etc.). Hand excavation may be required in the vicinity of the SCSD concrete piping, the two 24-inch diameter sewer utilities, the water line, manholes and junction boxes to maximize

the amount of soil removed and minimize the potential of damage to the utilities. Soils located beneath the utilities may need to remain in place. It was assumed in developing this alternative that 10% of the soil volume would require hand excavation. Prior to disposal in a landfill, further characterization would be required to determine if the soils would be characterized as a TSCA waste. Soils with PCB concentrations greater than 50 ppm will be transported to Wayne Disposal. Soils with total PCB concentrations less than 50 ppm will be transported to a Type II landfill.

During excavation, dust suppression measures may be implemented to reduce the amount of fugitive dust emissions generated. Following completion of the excavation, soil verification samples would be collected at the bottom and sidewalls of the excavation to determine if all of the soil contamination exceeding the USEPA target of 10 ppm was removed. After determining that the remaining soil is below criteria, the excavated area would then be backfilled with clean fill. The roadways, curbing, and meridians will then be restored to their original conditions.

Alternative 5: Expanded Excavation/Offsite Disposal and Utility Replacement

This alternative involves the following components:

- Excavation of the contaminated surface soil located near boring SCS-017, SCS-016, and SCS-030.
- Excavation of contaminated subsurface soils located in the utility corridor.
- Removal and replacement of the storm water and sanitary utilities.

Alternative 5 includes the excavation of contaminated surface soils near borings SCS-017, SCS-016, and SCS-030 as described in Alternative 2, and would also consist of excavating contaminated subsurface soils with PCB concentrations greater than 10 ppm at the intersection of Harper Avenue and Bon Brae Avenue (from manholes M7178 to M4281 and from the junction box to manhole M4262) and transporting the soil off-site to a landfill as described in Alternative 4. To avoid costs associated with hand excavation around the utilities and to ensure all contaminated soils are removed, the storm water piping, junction box, manholes, sanitary sewer

utilities, and water lines will be removed in their entirety and disposed offsite and replaced once excavation is completed. Temporary sanitary sewer connections and water utilities will be installed for use during the duration of the project. Temporary stormwater retention ponds will be constructed west of manhole M7178 and south of manhole M4262 to retain any stormwater that may accumulate during implementation of this alternative. By retaining the stormwater the disruptions to the excavation activities would be reduced. For the purpose of developing this alternative it was assumed the retention ponds would be 50 feet by 25 feet to a depth of 10 feet. The excavated material was assumed to contain low levels of PCBs and would require disposal in a Type II landfill. The retention ponds would be constructed in Harper Avenue and Bon Brae Avenue. The actual size and locations of the retention ponds would be determined during the design phase of remedial action. The accumulated stormwater would be removed utilizing a vac truck and disposed offsite. The excavation would be backfilled and the roadways, curbing, and meridians would then be restored to their original condition.

4.6 ANALYSIS OF ALTERNATIVES

This subsection discusses the evaluation of each alternative based on the following three criteria:

- Effectiveness.
- Implementability.
- Cost.

Effectiveness

This criterion was used to evaluate the effectiveness of the alternatives for protecting human health and the environment. Each alternative was also evaluated based on its effectiveness for reducing the toxicity, mobility, or volume of the contaminants. Reduction of toxicity, mobility, or volume refers to changes in one or more characteristics of the contaminated media by the use of treatment that decreases the inherent threats or risks associated with the contaminated media. Both short-and long-term components of effectiveness were evaluated. Short-term effectiveness refers to the construction and implementation period, and long-term effectiveness refers to the period after the remedial action is complete.

Implementability

The implementability criterion was used to evaluate each alternative with respect to its technical and administrative feasibility and the availability of needed technologies and services. Technical feasibility refers to the ability to construct, reliably operate, and meet technology-specific regulations for process options. Administrative feasibility refers to the ability to obtain approvals from other offices and agencies, the availability of treatment, storage, and disposal services and capacity, and the requirements for, and availability of, specific equipment and technical specialists.

Cost

The cost estimate includes total capital cost and O&M costs for implementing each alternative. The estimated present worth of the remedial alternatives was based on a discount rate of 6%.

A cost summary for each alternative is presented in **Tables 7** and **8**. Total capital costs are those expenditures required to initiate and implement a remedial action. Certain bid and scope contingencies have also been included in the cost estimates to account for unknowns, since this alternative evaluation consists of conceptual designs. Bid contingencies which include unknown costs such as adverse weather conditions, strikes, and unfavorable market conditions was assumed to be 10% of the capital costs. Scope contingencies cover changes in scope such as change orders that invariably occur during final design and implementation, and were assumed to be 25% of the capital costs. Permitting and legal costs were assumed to be 5% of the capital costs (including bid and scope contingencies) and include the supervision and administration of legal staff during the construction and design phases of the project. Construction services costs were assumed to be 15% of the capital costs (including bid and scope contingencies) and include the engineering supervision and administration during the construction phase. Engineering design costs were assumed to be 8% of the capital costs.

O&M cost estimates include yearly costs for system maintenance and/or monitoring. In order to compare the total cost of alternatives in 2005 dollars, the annualized O&M costs were converted to present worth values using a discount rate of 6% and the relative post-closure period.

Therefore, the total present worth of an alternative was the sum of the total capital cost and the present worth of the O&M costs.

Typically, FFS costs are expected to provide an accuracy of +50% to -30%. Final costs would depend on pilot test results, site access, actual labor and material costs, actual site conditions, market conditions, final project scope, engineering design, final project schedule, productivity, and other variable factors. As a result, the final costs would vary from the estimates presented in this report; however, most of these factors should not affect the relative cost differences between alternatives.

4.6.1 Analysis of Alternatives

Alternative 1: No Action

Since Alternative 1 consists of no action, this alternative would not be effective in protecting human health and the environment or reducing the toxicity, mobility, or volume of the contaminants. It will not meet the RAOs. Since this alternative does not involve implementing any process options, this alternative has no associated cost. If this alternative was implemented, continued recontamination of the SCSD corridor system may occur.

Alternative 2: Limited Excavation/Offsite Soil Disposal and Storm Sewer Restoration

The limited excavation near borings SCS-017, SCS-016, and SCS-030 and the restoration of the storm sewer system would be protective of human health and the environment. The excavation and removal of the surface soil will reduce the health risks due to direct contact with contaminated soil. The excavation and removal of the soil would also lessen the potential impact to surrounding areas by reducing the migration of contaminated surface soil to surface water and sediments via storm water runoff. The storm sewer restoration would be effective in eliminating sediment migration through cracks and breaks in the storm sewer piping. The alternative's effectiveness would depend upon proper design, construction, and installation of the liner system and sealing of the manholes and junction boxes. A breach in the liner or the seals in the manholes and junction box would reduce the effectiveness.

Short-term health risks to workers and area residents would be minimal. Dust suppressions would further minimize the risks. Workers would have to enter the manholes to apply the sealants to the manholes and junction boxes. The manholes and junction boxes would be considered confined spaces. Risks associated with entering confined spaces can be mitigated by proper air monitoring and backup rescue equipment.

This alternative would only minimally limit the mobility of the contaminants; it would not lessen the toxicity or volume of soil contamination. Based on the protectiveness of human health and the environment, the overall effectiveness of this alternative in meeting the RAOs would be high.

Excavation, storm sewer liner installation, and manhole sealing are proven, well-known technologies that would be easily implementable. There are contractors located in the area of the SCSD Site who are able to perform the work; however, installation of the storm sewer liner would involve specialized equipment and material that few contractors would be certified to perform. The excavation would be performed using conventional methods and should not present any special difficulties. The estimated total present worth cost for this alternative is estimated to be $1,097,000.

Alternative 3: Limited Excavation/Offsite Disposal and Hydraulic Containment

The limited excavation near borings SCS-017, SCS-016, and SCS-030 and the hydraulic containment system would be protective of human health and the environment. The excavation and removal of the surface soils will reduce the health risks due to direct contact with contaminated soil and will also lessen the potential impact to the surrounding areas by reducing the migration of contaminated surface soil to surface water and sediments via storm water runoff. Extraction of impacted groundwater would protect human health and the environment by reducing the migration of contaminants into the storm sewer system. This alternative would be effective in reducing the mobility of the contaminants, and may reduce the toxicity and volume of contamination by capturing and treating the PCB contamination. However, the reduction would not be significant since PCBs are hydrophobic and do not typically dissolve in water. Based on the protectiveness of human health and the environment, the overall effectiveness of this alternative in meeting the RAOs would be high. Long-term effectiveness would depend upon proper

design, construction, and maintenance of the extraction system components and treatment system.

Short-term health risks to workers and area residents would be minimal. The extraction and onsite treatment is an established technology and is effective in capturing impacted groundwater. The technologies associated with this alternative are technically implementable using conventional construction techniques. Based on the site geology and installation of monitoring wells during the SI, the installation of extraction wells should be easy to implement. Typical operation problems for an extraction system stem from failure of surface equipment, electrical and mechanical control systems, and chemical and biological precipitation causing plugging of wells and pumps.

Drilling and groundwater treatment equipment contractors are located in the area of the SCSD Site who are able to perform the work. The extraction well and monitoring well installation will be performed using conventional methods and should not present any special difficulties.

The total present worth of this alternative is estimated to be $1,695,000.

Alternative 4: Expanded Excavation/Offsite Disposal and Storm Sewer Restoration

Removal and offsite disposal of the contaminated soil would protect human health and the environment by reducing the potential health risks associated with exposure to the onsite contaminated soil. Removal of the contaminated soil would prevent impact to natural resources by reducing the possibility of migration of contaminated soil into the SCSD corridor. Although this alternative removes contaminated soil from the SCSD Site and reduces the mobility of the contaminants, it does not reduce the volume or toxicity of the contaminated media, but transfers the contaminants to an offsite location.

Short-term risks would be posed to the surrounding community and the on-site workers due to dust inhalation and ingestion; however, particulate emissions could be minimized using dust suppression measures. Additional short-term risks would be due to vehicular traffic for both hauling the contaminated soil to a landfill as well as delivery of the clean, imported soil that would be used as backfill. The alternative would significantly reduce the long-term risk;

however, contaminated soils remaining directly beneath some utilities may remain onsite. The risks of the soils migrating into the SCSD concrete piping would be minimized by the restoration of the storm sewer, manholes, and junction box. Based on the protectiveness of human health and the environment, the overall effectiveness of this alternative in meeting the RAOs would be high.

The technologies associated with this alternative are proven and well-known. Materials and equipment are readily available in the region. Since this alternative involves excavation near the existing utilities, implementing this alternative would be difficult. Excavation of a portion of the contaminated soils may have to be performed by hand to prevent damage to the existing utilities. In addition, some contaminated soils requiring removal are located beneath the groundwater table which would add to the level of difficulty. Shoring and bracing would be installed to minimize groundwater infiltration and to protect workers as the soils are being removed. Weather conditions may also influence the difficulty of the excavation. If fugitive dust emissions are a problem during implementation, dust suppression measures are readily available. Disposal capacity is readily available at landfills located in southeast Michigan. Overall, this alternative would be difficult to implement.

The estimated total present worth cost for Alternative 4 is estimated to be $2,053,000.

Alternative 5: Expanded Excavation/Offsite Disposal and Utility Replacement

Removal and offsite disposal of the contaminated soil would protect human health and the environment by reducing the potential health risks associated with exposure to the onsite contaminated soil. Removal of the contaminated soil would prevent impact to natural resources by reducing the possibility of migration of contaminated soil into the SCSD corridor. Although this alternative removes contaminated soil from the SCSD Site and reduces the mobility of the contaminants, it does not reduce the volume or toxicity of the contaminated media, but transfers the contaminants to an off-site landfill

Short-term risks would be posed to the surrounding community and the on-site workers due to dust inhalation and ingestion; however, particulate emissions could be minimized using dust

suppression measures. Additional short-term risks would be due to vehicular traffic for both hauling the contaminated soil to a landfill as well as delivery of the clean, imported soil that would be used as backfill. The alternative would significantly reduce the long-term risk. Based on the protectiveness of human health and the environment, the overall effectiveness of this alternative in meeting the RAOs would be high.

The technologies associated with this alternative are proven and well-known. Materials and equipment are readily available in the region. Some contaminated soils requiring removal are located beneath the groundwater table which may make removal difficult. Shoring and bracing would be installed to minimize groundwater infiltration and to protect workers as the soils are being removed. Weather conditions may also influence the difficulty of the excavation. If fugitive dust emissions are a problem during implementation, dust suppression measures are readily available. Disposal capacity is readily available at landfills located in southeast Michigan. Temporary water and sewer utility installation will be required during site activities. The installation of temporary water lines, sewer lines and retention ponds would be difficult to implement. Coordination with the residents, business owners, MCPWO, and SCS would be required to ensure adequate water and sewer services are provided. It is estimated that six residents and businesses along Bon Brae Avenue would require temporary water and sewer utility connections. The actual number of residents and business requiring temporary services will be determined during the design phase.

Any accumulated storm water would need to be diverted away from the excavation. The temporary retention ponds would greatly hinder traffic in the area. The decrease traffic in the area may adversely effect local businesses and inconvenience local residents. Diverting the storm water could be difficult, depending on the volume. Overall, this alternative would be very difficult to implement.

The estimated total present worth cost for Alternative 5 is estimated to be $1,804,000.

4.6.2 Comparative Analysis of Alternatives

The purpose of the comparative analysis is to evaluate the relative performance of all alternatives using each of the three criteria identified in **Subsection 4.6.1**. The comparative analysis identifies the advantages and disadvantages of each alternative relative to one another, so that key factors can be considered when selecting the appropriate remedial action for the SCSD Site.

Effectiveness

Alternative 1 is not effective. Alternatives 2 through 5 are variably effective in reducing risks associated with direct contact hazards and mitigating migration of the contaminants into the storm water sewer system. However, if Alternatives 2, 3, and 4 are implemented, the potential of soil migrating into the SCSD still exists, depending on the effectiveness of the sewer system sealing. Only Alternative 5 permanently prevents the recontamination of the SCSD. None of the alternatives lessen the toxicity or volume of the contaminants. Only Alternatives 3, 4, and 5 lessen the mobility of the contaminants.

Implementability

Alternative 1 does not involve any actions to be implemented. Personnel, equipment, and materials are readily available to implement each of the alternatives. Alternatives 2 and 3 would be easy to implement and would cause the least traffic interruptions. Alternatives 4 and 5 are the most difficult alternatives to implement due to the extent of excavation. Alternative 5 would be more difficult to implement than Alternative 4 due to the required temporary utility services and construction of temporary retention ponds.

Cost

No costs are associated with Alternative 1. Alternative 2 has the lowest total present worth. The Alternative 3 present worth (which prevents migration of the contaminants as Alternative 2 does), is much higher than the Alternative 2 present worth due to the long-term O&M requirements of the extraction and treatment system. The Alternative 4 present worth cost, which involves removal and offsite disposal of a majority of the contaminated soils, is greater

than the Alternative 5 present worth due to the costs of hand excavation and storm sewer restoration. There are many unknowns associated with Alternatives 4 and 5 that may increase the costs. These include the extent of contaminated soils, presence of additional utilities, and weather conditions,

4.7 SELECTION OF PREFERRED ALTERNATIVES

The selected remedial alternative shall achieve a degree of cleanup that is protective of the public health, safety, and welfare, and of the environment and natural resources. In addition, the cost of a remedial alternative shall be a factor only in choosing among alternatives that adequately protect the public health, safety, and welfare, and the environment and natural resources, consistent with cleanup criteria.

Alternative 1 does not meet the RAOs and is not recommended. Alternatives 2 through 5 meet the RAOs and all are technically feasible. Alternative 2 offers the same amount of protection as Alternative 3 with a substantial cost savings. Alternative 4 provides a high level of protection; however, residual contamination may be present, thus, the long-term risks would remain. Alternative 5 provides the greatest level of protection at substantially higher costs than Alternative 2. The Alternative 2 present worth of $1,097,000 offers a substantial cost savings and a reasonable amount of long-term protection, leading to Alternative 2 being selected as the preferred alternative.

SECTION 5

CONCLUSIONS AND RECOMMENDATIONS

5.1 CONCLUSIONS

The following conclusions are based on WESTON's review of available file information and the results of the April-May 2005 SI conducted by USEPA and MDEQ.

- Based on boring log information and an evaluation of subsurface structures, the stratigraphy of the study area is variably comprised of sand, clay, silty clay, sandy clay, and clayey sand zones extending to a depth of approximately 15 feet bgs.

- Groundwater was encountered at varying depths/locations during source area soil boring activities; however, the hydrogeologic setting of the study area is largely uncharacterized. Available information indicates that geologic materials are comprised of fine grained aquitard materials with poorly connected, interbedded water bearing coarse grained stratigraphic units encountered at varying depths.

- The occurrence and movement of groundwater within native soils at the site is largely uncharacterized. Based on available data it is assumed that no substantial water bearing zones exist in the upper 15-20 feet within the study area. Available data indicates that groundwater (where present) migrates to and from the SCSD corridor via fractures/void spaces in clayey units, interbedded sand seams, and adjacent utility corridors. Based on available information obtained from monitor wells set within the SCSD utility corridor it appears that groundwater is transmitted primarily through fill materials surrounding the SCSD concrete piping.

- PCB concentrations exceeded the TSCA Waste Characterization Level of 50 ppm at MSB-1 (8-9 feet bgs) at a concentration of 100 ppm, MSB-12 (8-8.5 feet bgs) at a concentration of 52 ppm, SCS-001 (9-12 feet bgs) at a concentration of 1,125 ppm, SCS-022-023 (1-3 feet bgs) at a concentration of 31,820 ppm, and SCS-025 (12-15 feet bgs) at a concentration of 152.9 ppm. PCBs also were detected at a concentration of 822 ppm at soil boring location SCS-017 (1-3 feet bgs) on the eastern portion of the J.M Olsen, Inc. property, and at one location adjacent to the water main along Harper Avenue.

- PCBs are present in site soils at 21 Geoprobe soil boring locations at concentrations exceeding the MDEQ Direct Contact criteria of 4 ppm at depths ranging from 0-6 feet bgs.

- PCBs in groundwater were detected at concentrations exceeding Part 201 GSI Criteria of 0.0002 ppm in samples collected at soil boring locations SCS-022, SCS-022-023, and SCS-025 adjacent to the SCSD utility corridor along Harper Avenue and Bon Brae Avenue, and at SCS-041 adjacent to the water main utility along Harper Avenue.

- VOCs were not detected in groundwater or soil samples at concentrations exceeding applicable criteria.

- PCBs were detected in residential sump system water sample SUMPPUMP-2 at a concentration exceeding Part 201 GSI Criteria for water.

Analytical data obtained during the source area Geoprobe investigations conducted by the USEPA and MDEQ during April and May 2005 indicate the presence of PCBs in native and fill soils surrounding the SCSD drainage system. In addition, PCB contamination remains uncharacterized vertically at boring locations SCS-023, SCS-024, SCS-084, SCS-085, SCS-025; however, based on the results of ongoing monitoring activities of sediments and water within the SCSD concrete piping conducted by MCPWO, SCS, et al., a significant source area outside the SCSD utility corridor has not been determined.

PCB concentrations exceeding 200,000 ppm have been detected in sediments collected from within the SCSD concrete piping at SCSD Manhole # M7179 located at the northwest corner of Harper Avenue and Bon Brae Avenue, suggesting that the current primary source of PCBs is within the SCSD utility corridor fill materials surrounding the drain. Additional drain sediment and concrete wipe samples indicate the presence of PCBs at high concentrations within the SCSD concrete piping primarily between Harper Avenue and E Street along Bon Brae Avenue.

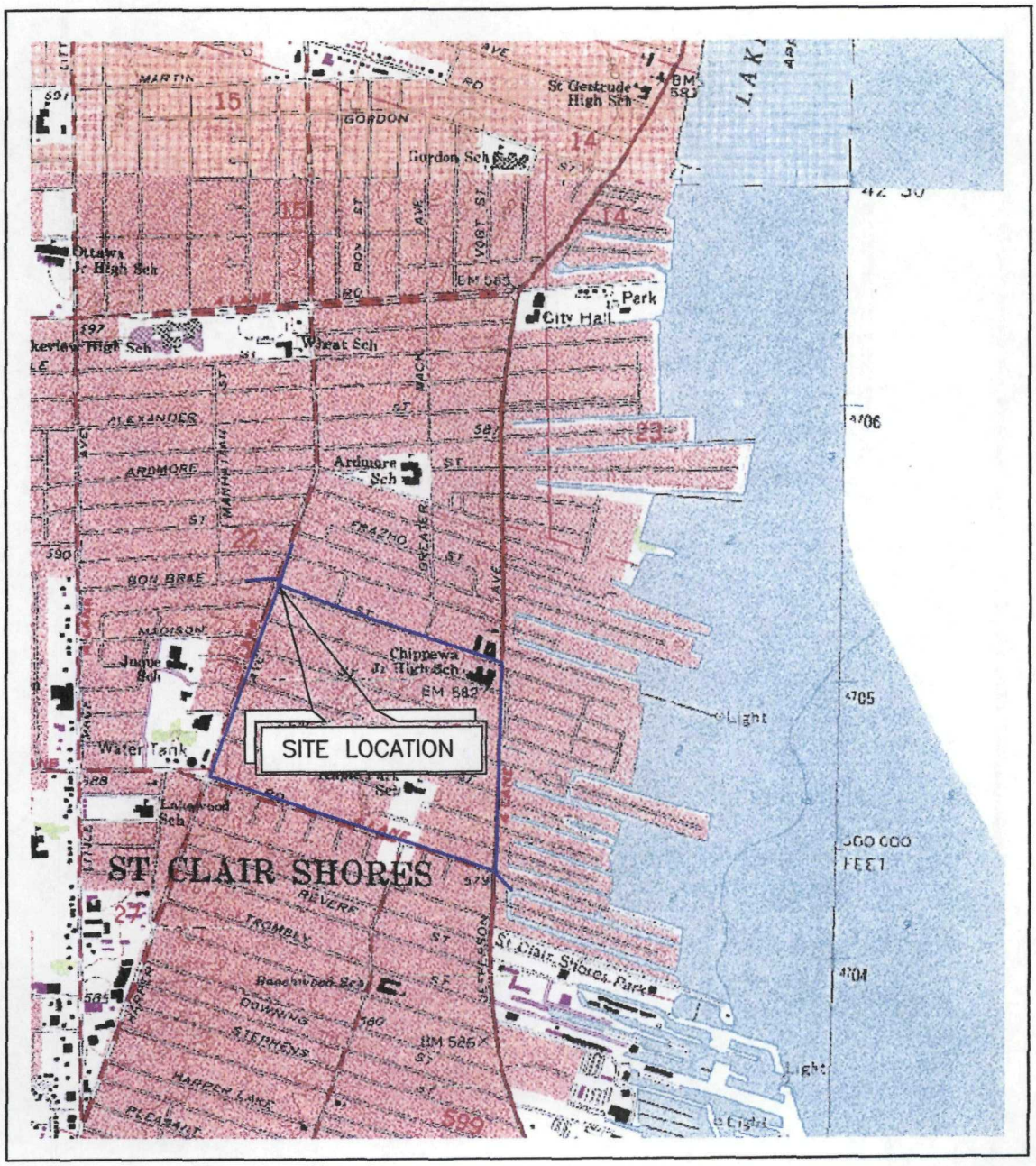
Based on the analytical results of Geoprobe source area soil and groundwater monitoring activities, and sump system sampling, limited hydraulic communication appears to exist within a series of poorly connected fine grained units and water-bearing seams of coarse grained materials, the SCSD utility corridor fill materials and concrete piping, the sanitary sewer system corridor, the water main corridor, the open drain utility, and area soils.

5.2 RECOMMENDATIONS

Pending MDEQ and USEPA concurrence, and based in part on meeting discussions held with USEPA, MDEQ, MCPWO, and SCS; WESTON recommends the implementation of the following remedial alternative(s):

- Alternative 2; Excavation of surface soils containing PCBs at concentrations exceeding the MDEQ Part 201 DC Criteria, and restoration of the SCSD concrete piping, manholes, and junction box.

FIGURES



SOURCE: U.S.G.S. 7.5 Minute Grosse Pointe Quadrangle

FIGURE 1

WESTON SOLUTIONS

2501 Jolly Rd
Okemos, Michigan
48864

SITE LOCATION MAP
SAINT CLAIR SHORES DRAIN SITE
St. Clair Shores, Michigan

FIGURES 2-7: SAMPLING LOCATIONS AND RESULTS MAPS

HAVE BEEN REDACTED – SIX PAGES

CONTAINS POTENTIAL PERSONALLY-IDENTIFYING INFORMATION

NORTH
A

HARPER AVENUE

SOUTH
A'

BON BRAE AVENUE

SCS-012 SCS-010 SCS-084 1040 SCS-001 SCS-002 SCS-085 SCS-024 SCS-023 SCS-022-023 SCS-020,021,022 MSB-12

DEPTH IN FEET BELOW GROUND SURFACE (BGS)

585 580 575 570 565 560 555

0 5 10 15 20 25 30

(0-3' bgs) ND
CL
(3-6) ND
SP
(6-9) ND
12" Sanitary
(6-9) ND
(9-12) 27

(4-5-9) 2.942
SP
SC
(9-12) 1,125
CL
(12-13.5) ND
SC

(6-9) 0.62
CL
SC
(12-15) ND
CL

(6-9) 26
SP
12" Sanitary
(9-12) 12
CL
(12-15) 25
SP

SP
CL
(4-5) 0.934
CL
(9-12) 5.696
(12-15) 19.86
CL

(0-3) 3.07
(3-6) ND
SP
(6-9) 0.024
(9-12) 38.92

(0-3) SP 31,820

(0-3) 2.1
(3-6) ND
SP
(6-9) ND
(9-12) ND
(12-15) ND
(15-16) ND

(0-4) 1.70
CL
(5-5.5) 27
(8-8.5) 52
CL
(15.5-16) ND

J01
Junction Box

LEGEND

- ND - PCBs Not Detected Above Target Method Detection Limit (TDL)
- PCBs Detected At Concentrations Ranging From 1-10 Parts Per Million (PPM)
- PCBs Detected At Concentrations Ranging From 11-50 PPM
- PCBs Detected At A Concentration Exceeding Toxic Substances Control Act Level of 50 PPM

VERTICAL 5'
0' 25'
APPROXIMATE SCALE

FIGURE 8

OMI\K:\20083.066.001TMD\A-A'.DWG	Designed By: JJV	Drawn By: JJV	Checked By: PB	Approved By: PB

WESTON SOLUTIONS

2501 Jolly Road
Suite 100
Okemos, Michigan

GEOLOGIC CROSS-SECTION A-A'
SAINT CLAIR SHORES DRAIN SITE
SAINT CLAIR SHORES, MICHIGAN

WEST

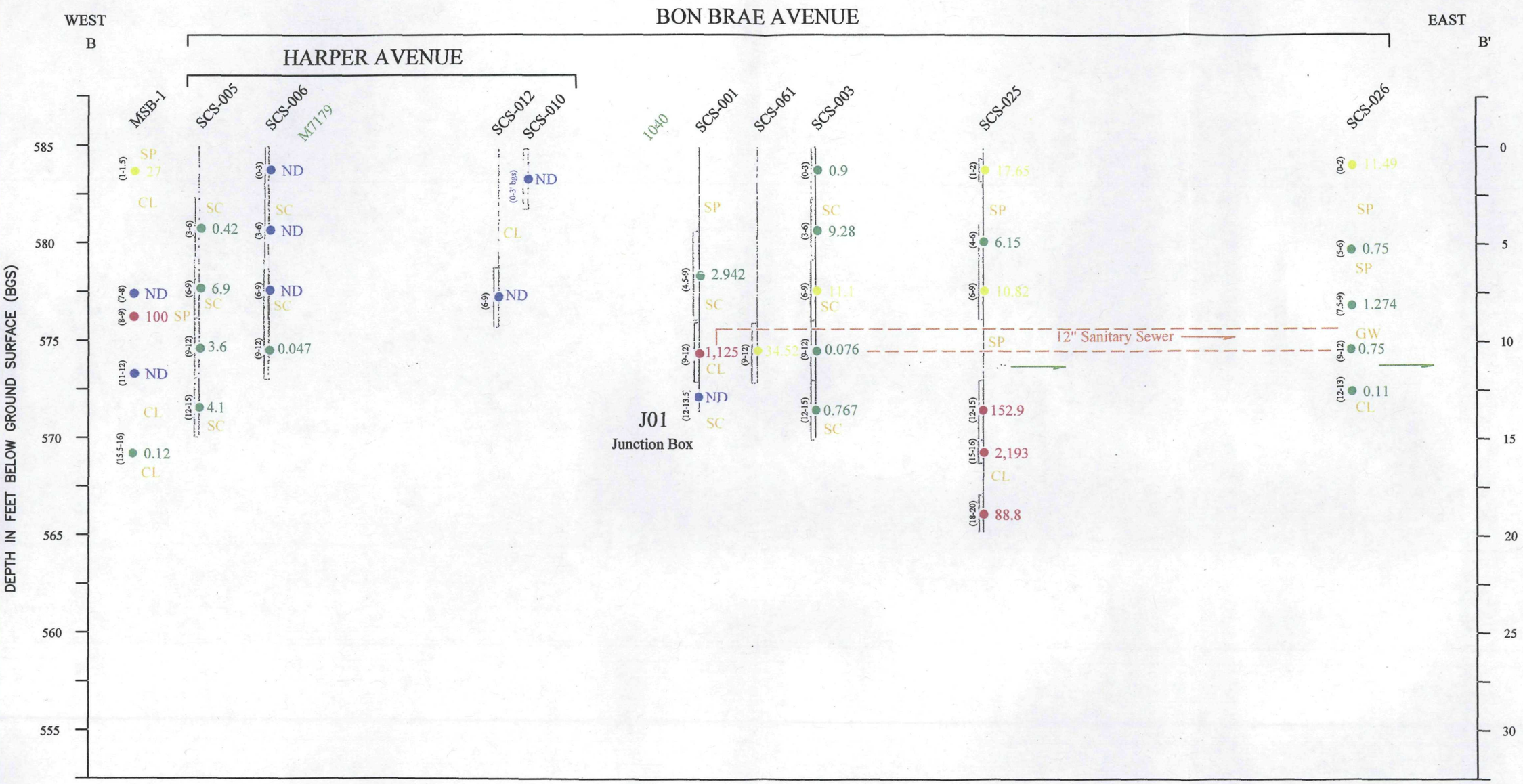
B

BON BRAE AVENUE

EAST

B'

HARPER AVENUE



LEGEND

- ND - PCBs Not Detected Above Target Method Detection Limit (TDL)
- PCBs Detected At Concentrations Ranging From 1-10 Parts Per Million (PPM)
- PCBs Detected At Concentrations Ranging From 11-50 PPM
- PCBs Detected At A Concentration Exceeding Toxic Substances Control Act Level of 50 PPM

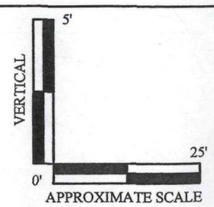


FIGURE 9

OMI\K:\20083.066.001TMD\B-B'.DWG	Designed By: JJV	Drawn By: JJV	Checked By: PB	Approved By: PB

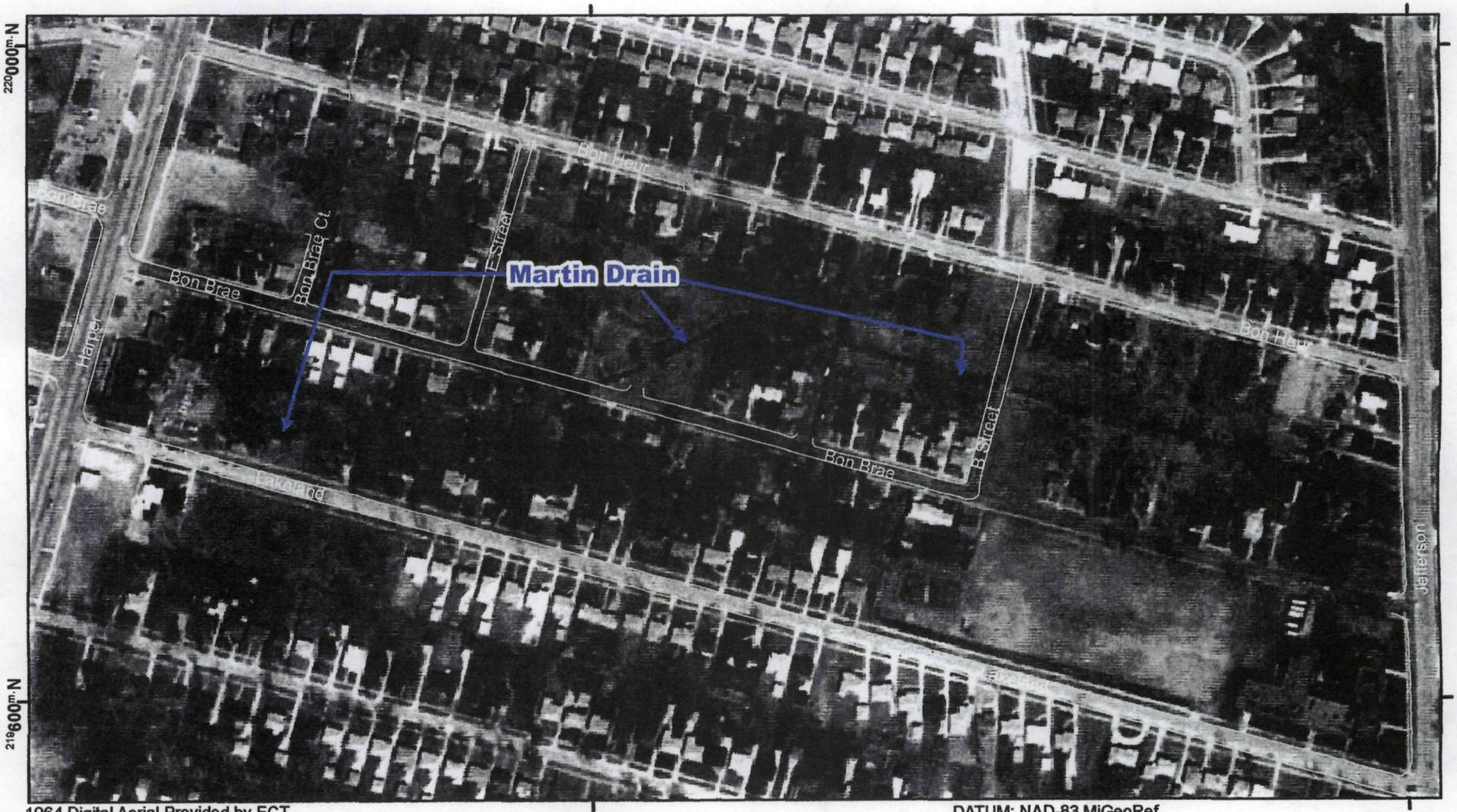
WESTON SOLUTIONS

2501 Jolly Road
Suite 100
Okemos, Michigan

GEOLOGIC CROSS-SECTION B-B'
SAINT CLAIR SHORES DRAIN SITE
SAINT CLAIR SHORES, MICHIGAN

1964 AERIAL PHOTO

10 Mile & Martin Drain



1964 Digital Aerial Provided by ECT

DATUM: NAD-83 MiGeoRef.

1 inch equals 300 feet

0 150 300 600 Feet

LOCATION: T1N, R13E, Sec. 22

MERA #: 500736

DEQ Remediation and Redevelopment Division

N
W E
S

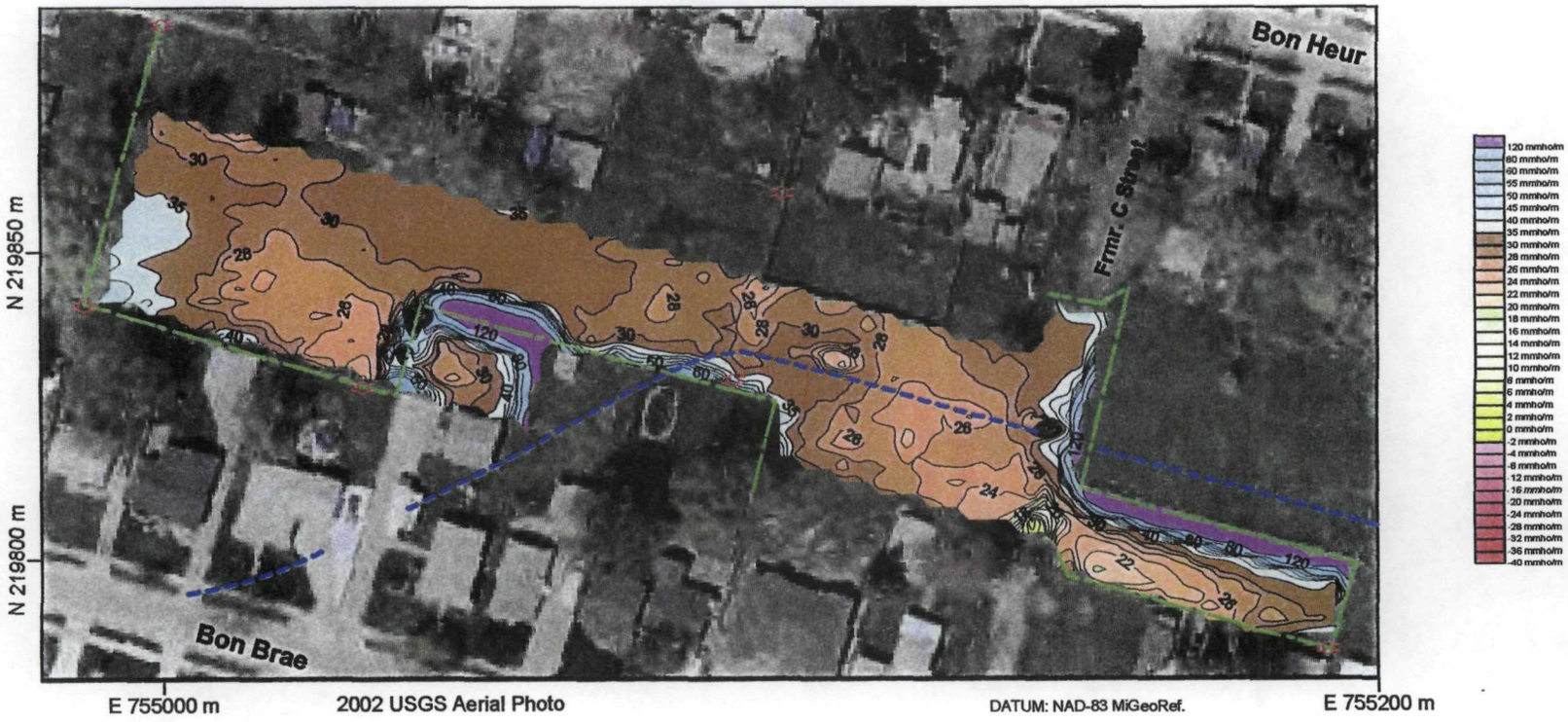
Legend:

Roads (GPS-05)

FIGURE 1

GROUND CONDUCTIVITY

10 Mile & Martin Drain



1 inch = 100 feet = 30.48 meters

0 m 30.48 m 60.96 m

LOCATION: T1N, R13E, Sec. 22

EM-31 Survey Conducted 5/05 by Tom Mann

N
W E
S

LEGEND:

Fence

Former Drain Location

Power Pole

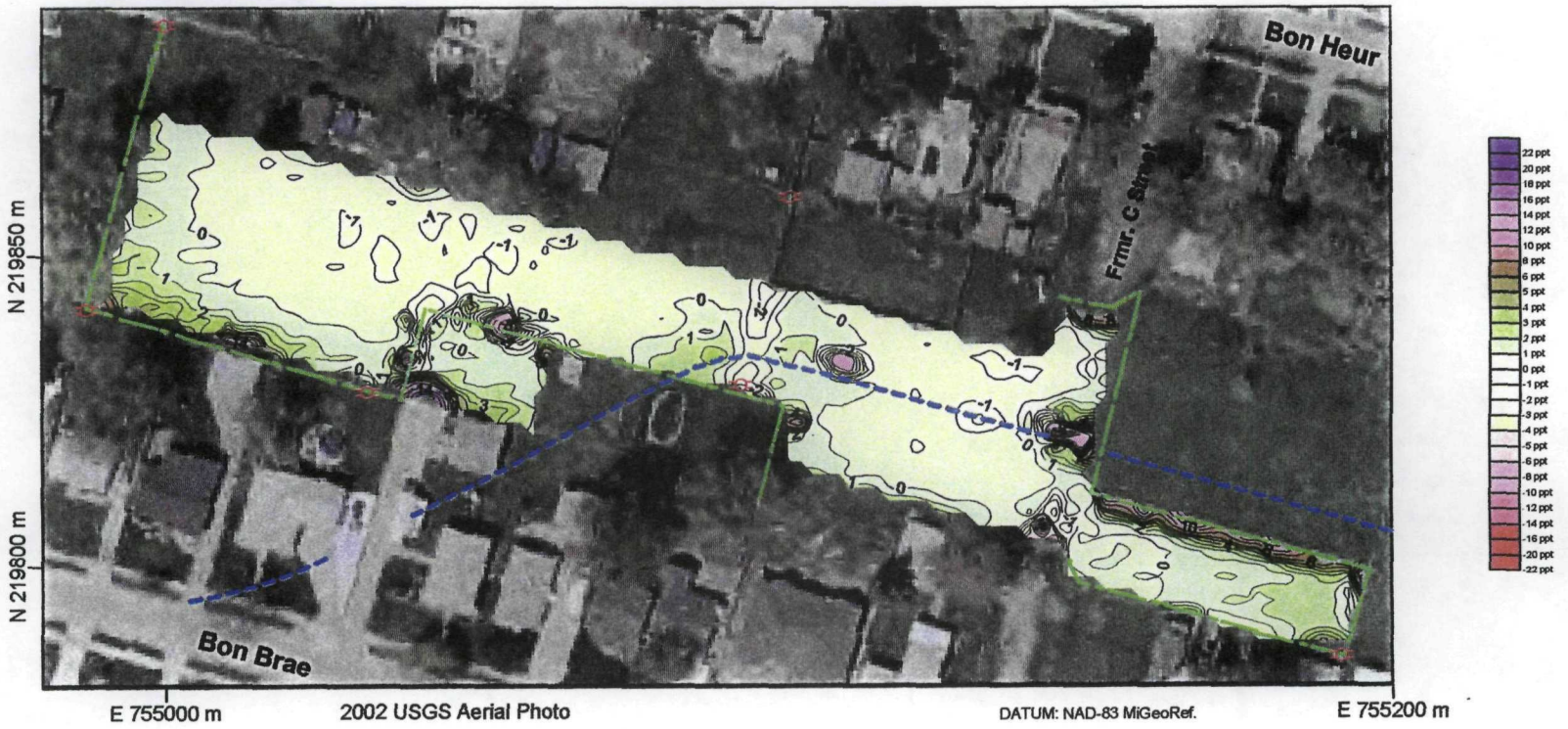
MERA #: 500736

DEQ Remediation and Redevelopment Division

FIGURE 2

IN-PHASE (Metal-Detection)

10 Mile & Martin Drain



1 inch = 100 feet = 30.48 meters

0 m 30.48 m 60.96 m

LOCATION: T1N, R13E, Sec. 22

EM-31 Survey Conducted 5/05 by Tom Mann

N
W E
S

LEGEND:

- Fence
- Former Drain Location
- Power Pole

MERA #: 500736

DEQ Remediation and Redevelopment Division

FIGURE 3

GROUND PENETRATING RADAR PROFILE

10 Mile & Martin Drain

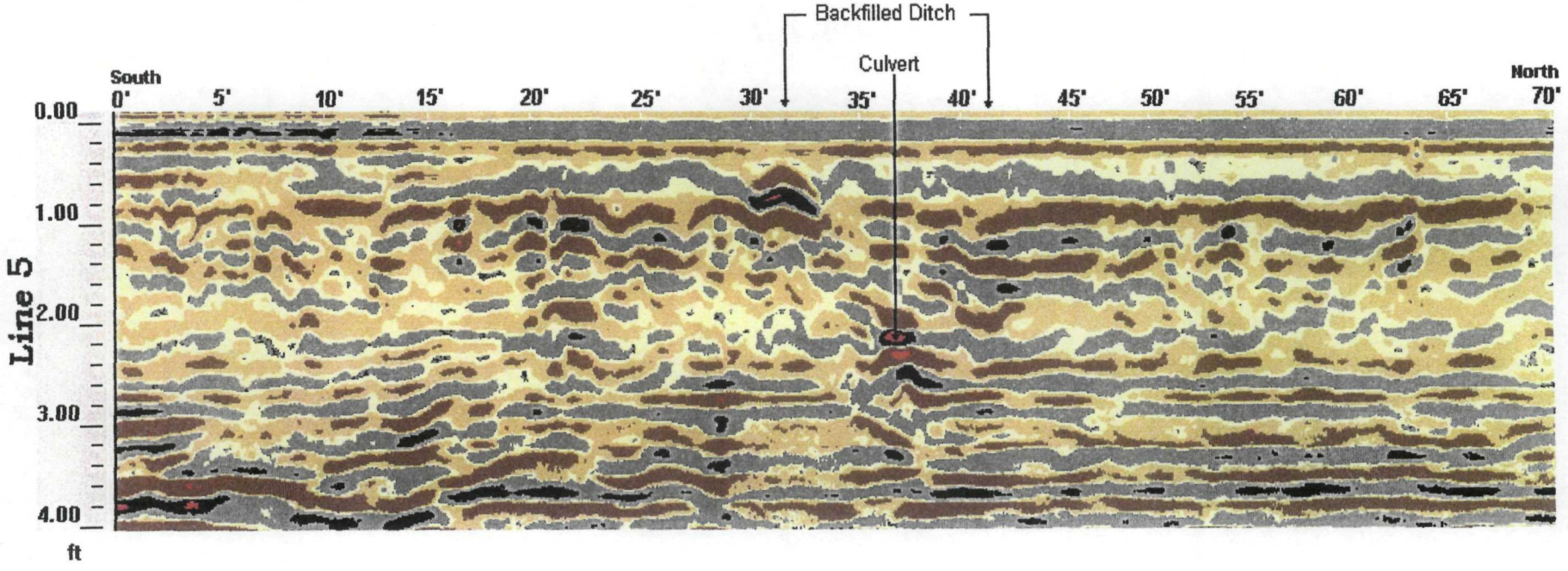


FIGURE 4

FIGURE 5: 10 MILE AND MARTIN DRAIN

HAS BEEN REDACTED – ONE PAGE

CONTAINS POTENTIAL PERSONALLY-IDENTIFYING INFORMATION

TABLES

TABLE 1
SUMMARY OF PCB SOIL ANALYTICAL RESULTS- APRIL 2005 (MDEQ)
SAINT CLAIR SHORES DRAIN SITE
ST. CLAIR SHORES, MICHIGAN

Sample location	MSB-1	MSB-1	MSB-1	MSB-1	MSB-1	MSB-2
Sample Interval	1-1.5'	7-8'	8-9'	11-12'	15.5-16'	0.5-1'
Date	4-Apr-05	4-Apr-05	4-Apr-05	4-Apr-05	4-Apr-05	4-Apr-05
Aroclor 1016	-	-	-	-	-	-
Aroclor 1221	-	-	-	-	-	-
Aroclor 1232	-	-	-	-	-	-
Aroclor 1242	-	-	-	-	-	-
Aroclor 1248	27	-	100	-	0.12	19
Aroclor 1254	-	-	-	-	-	-
Aroclor 1260	-	-	-	-	-	-
Aroclor 1262	-	-	-	-	-	-
Aroclor 1268	-	-	-	-	-	-
TOTAL PCBs	**27.0**	**-**	**100**	**-**	**0.12**	**19.0**

Notes:
All PCB concentrations reported in ppm
TSCA Waste Characterization Standard: 50 ppm
MDEQ Part 201 Generic Residential Soil
Volotilization to Indoor Air Criteria: 3000 ppm

Data Entered by EM
Data Checked by BB

TABLE 1
SUMMARY OF PCB SOIL ANALYTICAL RESULTS- APRIL 2005 (MDEQ)
SAINT CLAIR SHORES DRAIN SITE
ST. CLAIR SHORES, MICHIGAN

Sample location	MSB-2	MSB-2	MSB-2	MSB-3	MSB-3	MSB-3
Sample Interval	8-8.5'	11-11.5'	14-14.5'	1-2'	3.5-4'	8-9'
Date	4-Apr-05	4-Apr-05	4-Apr-05	4-Apr-05	4-Apr-05	4-Apr-05
Aroclor 1016	-	-	-	-	-	-
Aroclor 1221	-	-	-	-	-	-
Aroclor 1232	-	-	-	-	-	-
Aroclor 1242	-	-	-	-	-	-
Aroclor 1248	0.32	-	-	-	-	-
Aroclor 1254	0.12	-	-	-	-	-
Aroclor 1260	-	-	-	-	-	-
Aroclor 1262	-	-	-	-	-	-
Aroclor 1268	-	-	-	-	-	-
TOTAL PCBs	0.44	-	-	-	-	-

Notes:
All PCB concentrations reported in ppm
TSCA Waste Characterization Standard: 50 ppm
MDEQ Part 201 Generic Residential Soil
Volotilization to Indoor Air Criteria: 3000 ppm

TABLE 1
SUMMARY OF PCB SOIL ANALYTICAL RESULTS- APRIL 2005 (MDEQ)
SAINT CLAIR SHORES DRAIN SITE
ST. CLAIR SHORES, MICHIGAN

Sample location	MSB-3	MSB-3	MSB-4	MSB-4	MSB-4	MSB-4
Sample Interval	12-13'	15.5-16'	1'	7-8'	11.5-12'	15-16'
Date	4-Apr-05	4-Apr-05	4-Apr-05	4-Apr-05	4-Apr-05	4-Apr-05
Aroclor 1016	-	-	-	-	-	-
Aroclor 1221	-	-	-	-	-	-
Aroclor 1232	-	-	-	-	-	-
Aroclor 1242	-	-	-	-	-	-
Aroclor 1248	**0.16**	-	**0.26**	-	-	-
Aroclor 1254	-	-	**0.17**	-	-	-
Aroclor 1260	-	-	-	-	-	-
Aroclor 1262	-	-	-	-	-	-
Aroclor 1268	-	-	-	-	-	-
TOTAL PCBs	**0.16**	-	**0.43**	-	-	-

Notes:
All PCB concentrations reported in ppm
TSCA Waste Characterization Standard: 50 ppm
MDEQ Part 201 Generic Residential Soil
Volotilization to Indoor Air Criteria: 3000 ppm

Data Entered by EM
Data Checked by BB

TABLE 1
SUMMARY OF PCB SOIL ANALYTICAL RESULTS- APRIL 2005 (MDEQ)
SAINT CLAIR SHORES DRAIN SITE
ST. CLAIR SHORES, MICHIGAN

Sample location	MSB-5	MSB-5	MSB-5	MSB-5	MSB-5	MSB-6
Sample Interval	1-1.5'	3-4'	7-8'	11-11.5'	15-16'	0.5-1'
Date	5-Apr-05	5-Apr-05	5-Apr-05	5-Apr-05	5-Apr-05	5-Apr-05
Aroclor 1016	-	-	-	-	-	-
Aroclor 1221	-	-	-	-	-	-
Aroclor 1232	-	-	-	-	-	-
Aroclor 1242	-	-	-	-	-	-
Aroclor 1248	-	-	-	-	-	-
Aroclor 1254	-	-	-	-	-	-
Aroclor 1260	-	-	-	-	-	-
Aroclor 1262	-	-	-	-	-	-
Aroclor 1268	-	-	-	-	-	-
TOTAL PCBs	-	-	-	-	-	-

Notes:
All PCB concentrations reported in ppm
TSCA Waste Characterization Standard: 50 ppm
MDEQ Part 201 Generic Residential Soil
Volotilization to Indoor Air Criteria: 3000 ppm

TABLE 1
SUMMARY OF PCB SOIL ANALYTICAL RESULTS- APRIL 2005 (MDEQ)
SAINT CLAIR SHORES DRAIN SITE
ST. CLAIR SHORES, MICHIGAN

Sample location	MSB-6	MSB-6	MSB-7	MSB-7	MSB-7	MSB-7
Sample Interval	8.5-9'	15-16'	0-0.5'	4-4.5'	7.5-8'	11.5-12'
Date	5-Apr-05	5-Apr-05	5-Apr-05	5-Apr-05	5-Apr-05	5-Apr-05
Aroclor 1016	-	-	-	-	-	-
Aroclor 1221	-	-	-	-	-	-
Aroclor 1232	-	-	-	-	-	-
Aroclor 1242	-	-	-	-	-	-
Aroclor 1248	-	-	0.95	19	-	-
Aroclor 1254	-	-	0.53	-	-	-
Aroclor 1260	-	-	-	-	-	-
Aroclor 1262	-	-	-	-	-	-
Aroclor 1268	-	-	-	-	-	-
TOTAL PCBs	-	-	1.48	19.0	-	-

Notes:
All PCB concentrations reported in ppm
TSCA Waste Characterization Standard: 50 ppm
MDEQ Part 201 Generic Residential Soil
Volotilization to Indoor Air Criteria: 3000 ppm

Data Entered by EM
Data Checked by BB

TABLE 1
SUMMARY OF PCB SOIL ANALYTICAL RESULTS- APRIL 2005 (MDEQ)
SAINT CLAIR SHORES DRAIN SITE
ST. CLAIR SHORES, MICHIGAN

Sample location	MSB-7	MSB-9	MSB-9	MSB-9	MSB-9	MSB-10
Sample Interval	15.5-16'	3.5-3.8'	3.8-4'	4-5'	6-7'	3-4'
Date	5-Apr-05	5-Apr-05	5-Apr-05	5-Apr-05	5-Apr-05	5-Apr-05
Aroclor 1016	-	-	-	-	-	-
Aroclor 1221	-	-	-	-	-	-
Aroclor 1232	-	-	-	-	-	-
Aroclor 1242	-	-	-	-	-	-
Aroclor 1248	-	5	0.31	-	-	24
Aroclor 1254	-	-	0.34	0.4	-	16
Aroclor 1260	-	-	-	-	-	-
Aroclor 1262	-	-	-	-	-	-
Aroclor 1268	-	-	-	-	-	-
TOTAL PCBs	-	5.00	0.65	0.40	-	40.0

Notes:
All PCB concentrations reported in ppm
TSCA Waste Characterization Standard: 50 ppm
MDEQ Part 201 Generic Residential Soil
Volotilization to Indoor Air Criteria: 3000 ppm

Data Entered by EM
Data Checked by BB

TABLE 1
SUMMARY OF PCB SOIL ANALYTICAL RESULTS- APRIL 2005 (MDEQ)
SAINT CLAIR SHORES DRAIN SITE
ST. CLAIR SHORES, MICHIGAN

Sample location	MSB-10	MSB-10	MSB-10	MSB-11	MSB-11	MSB-11
Sample Interval	4-4.5'	10-10.5'	13-13.5'	0.5-1'	11-12'	12.5-13'
Date	5-Apr-05	5-Apr-05	5-Apr-05	5-Apr-05	5-Apr-05	5-Apr-05
Aroclor 1016	-	-	-	-	-	-
Aroclor 1221	-	-	-	-	-	-
Aroclor 1232	-	-	-	-	-	-
Aroclor 1242	-	-	-	-	-	-
Aroclor 1248	13	0.18	3.10	0.17	-	-
Aroclor 1254	6.1	-	2.20	-	-	-
Aroclor 1260	-	-	-	-	-	-
Aroclor 1262	-	-	-	-	-	-
Aroclor 1268	-	-	-	-	-	-
TOTAL PCBs	19.1	0.18	5.30	0.17	-	-

Notes:
All PCB concentrations reported in ppm
TSCA Waste Characterization Standard: 50 ppm
MDEQ Part 201 Generic Residential Soil
Volotilization to Indoor Air Criteria: 3000 ppm

TABLE 1
SUMMARY OF PCB SOIL ANALYTICAL RESULTS- APRIL 2005 (MDEQ)
SAINT CLAIR SHORES DRAIN SITE
ST. CLAIR SHORES, MICHIGAN

Sample location	MSB-11	MSB-12	MSB-12	MSB-12	MSB-12	MSB-13
Sample Interval	15.5-16'	0-4'	5-5.5'	8-8.5'	15.5-16'	0.5-1'
Date	5-Apr-05	5-Apr-05	5-Apr-05	5-Apr-05	5-Apr-05	5-Apr-05
Aroclor 1016	-	-	-	-	-	-
Aroclor 1221	-	-	-	-	-	-
Aroclor 1232	-	-	-	-	-	-
Aroclor 1242	-	1.70	-	-	-	-
Aroclor 1248	-	-	27	52	-	0.37
Aroclor 1254	-	-	-	-	-	-
Aroclor 1260	-	-	-	-	-	-
Aroclor 1262	-	-	-	-	-	-
Aroclor 1268	-	-	-	-	-	-
TOTAL PCBs	-	1.70	27.0	52.0	-	0.37

Notes:
All PCB concentrations reported in ppm
TSCA Waste Characterization Standard: 50 ppm
MDEQ Part 201 Generic Residential Soil
Volotilization to Indoor Air Criteria: 3000 ppm

TABLE 2
SUMMARY OF PCB SOIL ANALYTICAL RESULTS
U.S. EPA/MDEQ - MAY 2005
SAINT CLAIR SHORES DRAIN SITE
ST. CLAIR SHORES, MICHIGAN

Sample location	SCS - 001 (4.5 - 9')S	SCS - 001 (9 - 12')S	SCS - 001 (12 - 13.5')S	SCS - 002 (6 - 9')S	SCS - 002 (12 - 15')N	SCS - 003 (0 - 3')	SCS - 003 (3 - 6')S	SCS - 003 (6 - 9')N
SDG Number	E0027	E0027	E0027	E0026	E0026	E0026	E0026	E0026
Sample Interval	4.5 - 9'	9 - 12'	12 - 13.5'	6 - 9'	12 - 15'	0 - 3'	3 - 6'	6 - 9'
Date	17-May-05	17-May-05	17-May-05	17-May-05	17-May-05	17-May-05	17-May-05	17-May-05
PARAMETERS								
Aroclor - 1016	-	-	-	-	-	-	-	-
Aroclor - 1221	-	-	-	-	-	-	-	-
Aroclor - 1232	-	-	-	-	-	-	-	-
Aroclor - 1242	-	-	-	-	-	-	-	-
Aroclor - 1248	2.1 DL	990 DL	-	0.45	-	0.59	6.6 DL	7.82 DL
Aroclor - 1254	0.760J DL	120	-	0.17	-	0.31J	2.4 DL	3.1 DL
Aroclor - 1260	0.082	15	-	-	-	-	0.28J	0.2J
TOTAL PCBS	2.94J	1,125	-	0.62	-	0.9J	9.28J	11.1J

Notes:
All PCB concentrations reported in ppm.
J - Analyte concentration is estimated.
DL - Concentration reported is a diluted sample result.
TSCA Waste Characterization Level: 50 ppm
MDEQ Part 201 Generic Residential Direct Contact Criteria: 4 ppm
MDEQ Part 201 Generic Residential Soil Volatilization to Indoor Air Criteria: 3000 ppm
NA - Sample analyzed by the MDEQ lab, therefore, SDG number does not exist.
SDG - Sample Data Group

10/17/2005
Data Entered By: EM
Data Checked By: BB

TABLE 2
SUMMARY OF PCB SOIL ANALYTICAL RESULTS
U.S. EPA/MDEQ - MAY 2006
SAINT CLAIR SHORES DRAIN SITE
ST. CLAIR SHORES, MICHIGAN

Sample Location	SCS-SB1 (0-1')	SCS-SB2 (1-2')	SCS-SB3 (0-1')	SCS-SB4 (0-1')	SCS-SB5 (2-3')	SCS-SB6 (0-1')	SCS-SB7 (1-2')	SCS-SB8 (2-3')
MDEQ Number	19806	19807	19808	19809	19810	19811	19812	19813
Sample Interval	0 - 1'	1' - 2'	0 - 1'	1' - 2'	2' - 3'	0 - 1'	1' - 2'	2' - 3'
Date	17-May-06	17-May-06	17-May-06	17-May-06	16-May-06	17-May-06	17-May-06	17-May-06
PARAMETERS								
Aroclor 1016	<	<	<	<	<	<	<	<
Aroclor 1221	<	<	<	<	<	<	<	<
Aroclor 1232	<	<	<	<	<	<	<	<
Aroclor 1242	<	<	<	<	<	<	<	<
Aroclor 1248	0.076	0.44	1.0 J [3]			<	0.30	4.4 [3]
Aroclor 1254		0.36	1.0 [3]				0.13	2.7 [3]
Aroclor 1260		0.21 J						0.3
TOTAL PCBS	0.076	0.79 J	ND			ND	0.43	8.1

Notes:
All PCB concentrations reported in ppm
J - Analyte concentration is estimated
[3] - Concentration reported is a diluted sample result
TSCA Waste Characterization Level: 50 ppm
Residential Direct Contact
Criteria: 1 ppm
MDEQ Part 201 Generic Residential Soil Volatilization
to Indoor Air Criteria: 2000 ppm
NA - Sample analyzed by the MDEQ lab therefore SCS number does not exist
SCS - Sample Data Group

10/17/2006
Data Entered By: EM
Data Checked By: BB

TABLE 2
SUMMARY OF PCB SOIL ANALYTICAL RESULTS
U.S. EPA/MDEQ - MAY 2005
SAINT CLAIR SHORES DRAIN SITE
ST. CLAIR SHORES, MICHIGAN

Sample location	SCS - 005 (9 - 12')S	SCS - 005 (12 - 15')S	SCS - 006 (0 - 3')S	SCS - 006 (3 - 6')S	SCS - 006 (6 - 9')S	SCS - 006 (9 - 12')S	SCS - 007 (0 - 3')S	SCS-007 (0-3')SD[DUP-1
SDG Number	E0027	E0027	E0026	E0026	E0027	E0026	E0026	E0026
Sample Interval	9 - 12'	12 - 15'	0 - 3'	3 - 6'	6 -9'	9 - 12'	0 - 3'	NA
Date	17-May-05	17-May-05	17-May-05	17-May-05	17-May-05	17-May-05	18-May-05	18-May-05
PARAMETERS								
Aroclor - 1016	-	-	-	-	-	-	-	-
Aroclor - 1221	-	-	-	-	-	-	-	-
Aroclor - 1232	-	-	-	-	-	-	-	-
Aroclor - 1242	-	-	-	-	-	-	-	-
Aroclor - 1248	2.4 DL	2.8 DL	-	-	-	0.047	1.6 J DL	2.1 DL
Aroclor - 1254	1.1 DL	1.2 DL	-	-	-	-	1.1 DL	1.8 DL
Aroclor - 1260	0.062	0.058	-	-	-	-	0.033J	0.130J
TOTAL PCBS	3.562	4.058	-	-	-	0.047	2.733J	4.030J

Notes:
All PCB concentrations reported in ppm.
J - Analyte concentration is estimated.
DL - Concentration reported in a diluted sample result.
TSCA Waste Characterization Level: 50 ppm
Residential Direct Contact
Criteria: 4 ppm
MDEQ Part 201 Generic Residential Soil Volatilization
to Indoor Air Criteria: 3000 ppm
NA - Sample analyzed by the MDEQ lab, therefore, SDG number does not exist.
SDG - Sample Data Group

10/17/2005
Data Entered By: EM
Data Checked By: BB

TABLE 2
SUMMARY OF PCB SOIL ANALYTICAL RESULTS
U.S. EPA/MDEQ - MAY 2006
SAINT CLAIR SHORES DRAIN SITE
ST. CLAIR SHORES, MICHIGAN

Sample Location	SC-S-007(0-0"6)	SC-S-007(6-9"6)	SC-S-007(9-11"6)	SC-S-008(0-1"6)	SC-S-008(1-4"6)	SC-S-008(4-9"6)	SC-S-008(9-12"6)	SC-S-009(0-1"6)
Matrix Number	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Sample Interval	0 - 6"	6 - 9"	9 - 11"	0 - 1"	1 - 4"	4 - 9"	9 - 12"	0 - 1"
Date	10-May-06	10-May-06	10-May-06	10-May-06	10-May-06	10-May-06	10-May-06	10-May-06
PARAMETERS								
Aroclor - 1016	<	<	<	<	<	<	<	<
Aroclor - 1221	<	<	<	<	<	<	<	<
Aroclor - 1232	<	<	<	<	<	<	<	<
Aroclor - 1242	<	<	<	<	<	<	<	<
Aroclor - 1248	0.6 J [1]	0.605		0.28	0.1	0.147		
Aroclor - 1254	1.7 [1]	0.67J		0.13	0.0633 J	0.07 J		
Aroclor - 1260	0.12 J	<		<	<	<		
TOTAL PCBs	2.32M	0.195		0.41	0.163M	0.217		

Notes
All PCB concentrations reported in ppm
J - Analyte concentration is estimated
DL - Concentration reported is a diluted sample result
TSCA Waste Characterization Level - 50 ppm
MDEQ Part 201 Generic Residential Direct Contact Criteria - 1 ppm
MDEQ Part 201 Generic Residential Soil Volatilization to Indoor Air Criteria - 2000 ppm
NA - Sample analyzed by the MDEQ lab, therefore SDG number does not exist
SDG - Sample Data Group

10/17/2006
Data Entered By: EM
Data Checked By: BB

TABLE 2
SUMMARY OF PCB SOIL ANALYTICAL RESULTS
U.S. EPA/MDEQ - MAY 2005
SAINT CLAIR SHORES DRAIN SITE
ST. CLAIR SHORES, MICHIGAN

Sample location	SCS - 009 (6 - 9')S	SCS - 009 (9 - 12')S	SCS - 010 (0 - 3')S	SCS-010 (0-3')SDUP - 2	SCS - 012 (6 - 9')S	SCS - 013 (0 - 3')S	SCS - 013 (3 - 6')S	SCS - 013 (6 - 9')S
SDG Number	E0070	E0070	E0070	E0070	E0070	E0070	E0070	E0070
Sample Interval	6 - 9'	9 - 12'	0 - 3'	NA	6 - 9'	0 - 3'	3 - 6'	6 - 9'
Date	18-May-05	18-May-05	18-May-05	18-May-05	18-May-05	18-May-05	18-May-05	18-May-05
PARAMETERS								
Aroclor - 1016	-	-	-	-	-	-	-	-
Aroclor - 1221	-	-	-	-	-	-	-	-
Aroclor - 1232	-	-	-	-	-	-	-	-
Aroclor - 1242	-	-	-	-	-	-	-	-
Aroclor - 1248	-	0.078	-	-	-	0.52	0.44	1.3 J DL
Aroclor - 1254	-	0.065	-	-	-	0.49	0.46	0.980 DL
Aroclor - 1260	-	-	-	-	-	0.045J	0.053J	0.091J
TOTAL PCBS	-	0.143	-	-	-	1.055J	0.953J	2.271J

Notes:
All PCB concentrations reported in ppm.
J - Analyte concentration is estimated.
DL - Concentration reported is a diluted sample result.
TSCA Waste Characterization Level: 50 ppm
MDEQ Part 201 Generic Residential Direct Contact Criteria: 4 ppm
MDEQ Part 201 Generic Residential Soil Volatilization to Indoor Air Criteria: 3000 ppm
NA - Sample analyzed by the MDEQ lab, therefore, SDG number does not exist.
SDG - Sample Data Group

10/17/2005
Data Entered By: EM
Data Checked By: BB

TABLE 2
SUMMARY OF PCB SOIL ANALYTICAL RESULTS
U.S. EPA/MDEQ - MAY 2008
SAINT CLAIR SHORES DRAIN SITE
ST CLAIR SHORES, MICHIGAN

	Sample Identification	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	Matrix Procedure	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)
	Sample Interval	0 - 12	NA	11.5 - 13	3 - 4	0 - 3	7 - 8	1 - 3	3 - 4
	Date	16-May-08	16-May-08	16-May-08	16-May-08	16-May-08	16-May-08	16-May-08	16-May-08
PARAMETERS									
Aroclor - 1016									
Aroclor - 1221									
Aroclor - 1232									
Aroclor - 1242		0.630J	0.34						
Aroclor - 1248				0.12		3.6 [7X]		0.90 [3X]	0.61
Aroclor - 1254						0.91X		1.0m [3X]	0.49
Aroclor - 1260						0.33 J		1.2	0.251 J
TOTAL PCBS		0.63J	0.34	0.12		5.05J		2.11	0.111 J

Notes
All PCB concentrations reported in ppm
J Analyte concentration is estimated
DL Concentration reported is a diluted sample result
TSCA Waste Characterization Level 50 ppm
Residential Direct Contact
Criteria 4 ppm
MDEQ Part 201 Generic Residential Soil Volatilization
to Indoor Air Criteria 2000 ppm
NA Sample analyzed by the MDEQ lab therefore SDG number does not exist
SDG Sample Data Group

TABLE 2
SUMMARY OF PCB SOIL ANALYTICAL RESULTS
U.S. EPA/MDEQ - MAY 2005
SAINT CLAIR SHORES DRAIN SITE
ST. CLAIR SHORES, MICHIGAN

Sample location	SCS - 018 (5 - 6')S	SCS - 019 (1 - 3')S	SCS - 019 (3 - 6')S	SCS - 019 (6 - 7')S	SCS - 019 (8 - 9')S	SCS - 019 (9 - 11')S	SCS-019 (9-11')SDUP - S	SCS - 020 (0 - 3')S
SDG Number	E0096	E0093	E0096	E0096	E0093	E0093	E0070	E0093
Sample Interval	5 - 6'	1 - 3'	3 - 6'	6 - 7'	8 - 9'	9 - 11'	NA	0 - 3'
Date	19-May-05	19-May-05	19-May-05	19-May-05	19-May-05	19-May-05	19-May-05	19-May-05
PARAMETERS								
Aroclor - 1016	-	-	-	-	-	-	-	-
Aroclor - 1221	-	-	-	-	-	-	-	-
Aroclor - 1232	-	-	-	-	-	-	-	-
Aroclor - 1242	-	-	-	-	-	-	-	-
Aroclor - 1248	-	1.7 DL	0.13	-	-	-	-	0.47 J
Aroclor - 1254	0.11 J	2.3 DL	0.3	0.028J	-	-	-	1.5 DL
Aroclor - 1260	-	0.15 J	0.042	-	-	-	-	0.13 J
TOTAL PCBS	**0.11J**	**4.15J**	**0.472**	**0.028J**	-	-	-	**2.1J**

Notes:
All PCB concentrations reported in ppm.
J - Analyte concentration is estimated.
DL - Concentration reported is a diluted sample result.
TSCA Waste Characterization Level: 50 ppm
[illegible]
Residential Direct Contact
Criteria: 4 ppm
MDEQ Part 201 Generic Residential Soil Volatilization
to Indoor Air Criteria: 3000 ppm
NA - Sample analyzed by the MDEQ lab, therefore, SDG number does not exist.
SDG - Sample Data Group

10/17/2005
Data Entered By: EM
Data Checked By: BB

TABLE 2
SUMMARY OF PCB SOIL ANALYTICAL RESULTS
U.S. EPA/MDEQ - MAY 2005
SAINT CLAIR SHORES DRAIN SITE
ST. CLAIR SHORES, MICHIGAN

	Sample Location	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	Field Number	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	Sample Interval	[illegible]	NA	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	Date	10-May-05	10-May-05	10-May-05	10-May-05	10-May-05	10-May-05	10-May-05	10-May-05
PARAMETERS									
Aroclor - 1016		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Aroclor - 1221		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Aroclor - 1232		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Aroclor - 1242		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Aroclor - 1248		[illegible]		[illegible]			[illegible]	[illegible]	
Aroclor - 1254				[illegible]			[illegible]		
Aroclor - 1260				[illegible]			[illegible]		
TOTAL PCBs				[illegible]			[illegible]		

Notes
All PCB concentrations reported in ppm
J Analyte concentration is estimated
DL Concentration reported is a diluted sample result
TSCA Waste Characterization Level 50 ppm
MDEQ Part 201 Generic Residential Direct Contact Criteria 1 ppm
MDEQ Part 201 Generic Residential Soil Volatilization to Indoor Air Criteria 2000 ppm
NA Samples analyzed by the MDEQ lab, therefore SDG number does not exist
SDG Sample Data Group

10/17/2005
Data Entered By: EM
Data Checked By: BB

TABLE 2
SUMMARY OF PCB SOIL ANALYTICAL RESULTS
U.S. EPA/MDEQ - MAY 2005
SAINT CLAIR SHORES DRAIN SITE
ST. CLAIR SHORES, MICHIGAN

Sample location	SCS - 022 (15 -16')S	SCS - 022 - 023 (JK - 1)S	SCS - 023 (0 - 3')S	SCS - 023 (3 - 6')S	SCS - 023 (6 - 9')S	SCS - 023 (9 - 12')S	SCS - 024 (4 - 5')S	SCS - 024 (9 - 12')S
SDG Number	E0093	E00C4	E0093	E0093	E0093	E0093	E0093	E00C4
Sample Interval	15 - 16'		0 - 3'	3 - 6'	6 - 9'	9 - 12'	4 - 5'	9 - 12'
Date	19-May-05	19-May-05	19-May-05	19-May-05	19-May-05	19-May-05	19-May-05	19-May-05
PARAMETERS								
Aroclor - 1016	-	-	-	-	-	-	-	-
Aroclor - 1221	-	-	-	-	-	-	-	-
Aroclor - 1232	-	-	-	-	-	-	-	-
Aroclor - 1242	-	-	-	-	-	-	-	-
Aroclor - 1248	-	22,000 J DL	1.1 J DL	-	0.024J	22 DL	0.6	3.7 DL
Aroclor - 1254	-	9,200 DL	1.8 DL	-	-	16 DL	0.31	1.9 DL
Aroclor - 1260	-	620 J	0.17 J	-	-	0.92 J	0.024J	0.096 J
TOTAL PCBS	-	31828J	3.07J	-	0.024J	38.92J	0.934J	5.696J

Notes:
All PCB concentrations reported in ppm.
J - Analyte concentration is estimated.
DL - Concentration reported is a diluted sample result.
TSCA Waste Characterization Level: 50 ppm
[illegible]
Residential Direct Contact
Criteria: 4 ppm
MDEQ Part 201 Generic Residential Soil Volatilization
to Indoor Air Criteria: 3000 ppm
NA - Sample analyzed by the MDEQ lab, therefore, SDG number does not exist.
SDG - Sample Data Group

10/17/2005
Data Entered By: EM
Data Checked By: BB

TABLE 2
SUMMARY OF PCB SOIL ANALYTICAL RESULTS
U.S. EPA/MDEQ - MAY 2005
SAINT CLAIR SHORES DRAIN SITE
ST. CLAIR SHORES, MICHIGAN

Sample location	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Sample Number	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Sample Interval	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Date	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
PARAMETERS								
Aroclor - 1016		-	-	-	-	-	-	-
Aroclor - 1221	-	-	-	-	-	-	-	-
Aroclor - 1232	-	-	-	-	-	-	-	-
Aroclor - 1242	-	-	-	-	-	-		
Aroclor - 1248	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	-	[illegible]
Aroclor - 1254	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Aroclor - 1260	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
TOTAL PCBS	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Notes
All PCB concentrations reported in ppm
J Analyte concentration is estimated
DL Concentration reported is a diluted sample result
TSCA Waste Characterization Level [illegible] ppm
MDEQ Part 201 Generic Residential Direct Contact Criteria [illegible] ppm
MDEQ Part 201 Generic Residential Soil Volatilization to Indoor Air Criteria [illegible] ppm
NA Sample analyzed by the MDEQ lab therefore SDG number does not exist
SDG Sample Data Group

TABLE 2
SUMMARY OF PCB SOIL ANALYTICAL RESULTS
U.S. EPA/MDEQ - MAY 2005
SAINT CLAIR SHORES DRAIN SITE
ST. CLAIR SHORES, MICHIGAN

Sample location	SCS - 026 (5 - 6')S	SCS - 026 (7.5 - 9')S	SCS - 026 (9 - 12')S	SCS - 026 (12 - 13')S	SCS - 027 (3 - 6')S	SCS-027 (3-6')SDUP - S	SCS-027 (3-6')SDUP - S	SCS - 027 (12 - 15')S
SDG Number	I00C4	I00096	I00C4	I00096	I00C4	I00C4	I00C4	I00C11
Sample Interval	5 - 6'	7.5 - 9'	9 - 12'	12 - 13'	3 - 6'	NA	NA	12 - 15'
Date	20-May-05	20-May-05	20-May-05	20-May-05	24-May-05	24-May-05	24-May-05	24-May-05
PARAMETERS								
Aroclor - 1016	-	-	-	-	-	-	-	-
Aroclor - 1221	-	-	-	-	-	-	-	-
Aroclor - 1232	-	-	-	-	-	-	-	-
Aroclor - 1242	-	-	-	-	-	-	-	-
Aroclor - 1248	0.53	0.95 DL	0.53 J	0.11	0.04 J	0.1 J	0.033 J	0.19
Aroclor - 1254	0.2	0.3	0.21 J	-	0.023 J	0.051 J	0.032 J	0.079
Aroclor - 1260	0.02 J	0.024 J	0.015 J	-	-	-	0.02 J	-
TOTAL PCBS	**0.75J**	**1.274J**	**0.755J**	**0.11**	**0.063J**	**0.151J**	**0.075J**	**0.269**

Notes:
All PCB concentrations reported in ppm.
J - Analyte concentration is estimated.
DL - Concentration reported is a diluted sample result.
TSCA Waste Characterization Level: 50 ppm
MDEQ Part 201 Generic Residential Direct Contact Criteria: 4 ppm
MDEQ Part 201 Generic Residential Soil Volatilization to Indoor Air Criteria: 3000 ppm
NA - Sample analyzed by the MDEQ lab, therefore, SDG number does not exist.
SDG - Sample Data Group

10/17/2006
Data Entered By: EM
Data Checked By: BB

TABLE 2
SUMMARY OF PCB SOIL ANALYTICAL RESULTS
U.S. EPA/MDEQ - MAY 2006
SAINT CLAIR SHORES DRAIN SITE
ST. CLAIR SHORES, MICHIGAN

Sample Location	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
MDEQ Number	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Sample Interval	0 - 0	NA	1.0 - 1.5'	0 - 1	1 - 1	1.5 - 2.5'	1 - 1.5	1.5 - 2.5
Date	04-May-06	04-May-06	04-May-06	17-May-06	17-May-06	16-May-06	16-May-06	16-May-06
PARAMETERS								
Aroclor - 1016								
Aroclor - 1221								
Aroclor - 1232								
Aroclor - 1242								
Aroclor - 1248	[illegible]	[illegible]	[illegible]		[illegible]	[illegible]		[illegible]
Aroclor - 1254	[illegible]		[illegible]	[illegible]	[illegible]			[illegible]
Aroclor - 1260			[illegible]	[illegible]	[illegible]			[illegible]
TOTAL PCBS	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		[illegible]

Notes
All PCB concentrations reported in ppm
J Analyte concentration is estimated
DL Concentration reported is a diluted sample result
TSCA Waste Concentration Level 50 ppm
MDEQ Part 201 Generic Residential Direct Contact Criteria 4 ppm
MDEQ Part 201 Generic Residential Soil Volatilization to Indoor Air Criteria 2000 ppm
NA Sample analyzed by the MDEQ lab, therefore SDG number does not exist
SDG - Sample Data Group

TABLE 2
SUMMARY OF PCB SOIL ANALYTICAL RESULTS
U.S. EPA/MDEQ - MAY 2005
SAINT CLAIR SHORES DRAIN SITE
ST. CLAIR SHORES, MICHIGAN

Sample location	SCS - 034 (1.5 - 2')S	SCS - 034 (4 - 5)S	SCS-034 (4-5')BD1P - 4	SCS - 035 (1 - 1.5 ')S	SCS - 035 (4 - 5')S	SCS - 036 (0.5 - 1')S	SCS - 036 (1 - 2')S	SCS - 037 (1.5 - 2')S
SDG Number	E9070	E9026	E9070	E9070	E9070	E9070	E9070	E9027
Sample Interval	1.5 - 2'	4 - 5'	4 - 5'	1 - 1.5'	4 - 5'	0.5 - 1'	1 - 2'	4 - 5'
Date	18-May-05	18-May-05	18-May-05	18-May-05	18-May-05	18-May-05	18-May-05	19-May-05
PARAMETERS								
Aroclor - 1016	-	-	-	-	-	-	-	-
Aroclor - 1221	-	-	-	-	-	-	-	-
Aroclor - 1232	-	-	-	-	-	-	-	-
Aroclor - 1242	-	-	-	-	-	-	-	-
Aroclor - 1248	0.13 J	-	10 J DL	0.34	0.078	0.18 J	0.21	1.2 DL
Aroclor - 1254	0.22 J	0.49	2.8 J DL	-	0.074	-	0.29 J	0.66
Aroclor - 1260	0.1 J	-	0.46 J	0.1 J	-	-	0.027J	0.06
TOTAL PCBS	**0.45J**	**0.49**	**13.26J**	**0.44J**	**0.152**	**0.18J**	**0.527J**	**1.92J**

Notes:
All PCB concentrations reported in ppm.
J - Analyte concentration is estimated.
DL - Concentration reported is a diluted sample result.
TSCA Waste Characterization Level: 50 ppm
Residential Direct Contact
Criteria: 4 ppm
MDEQ Part 201 Generic Residential Soil Volatilization
to Indoor Air Criteria: 3000 ppm
NA - Sample analyzed by the MDEQ lab, therefore, SDG number does not exist.
SDG - Sample Data Group

10/17/2005
Data Entered By: EM
Data Checked By: BB

TABLE 2
SUMMARY OF PCB SOIL ANALYTICAL RESULTS
U.S. EPA/MDEQ - MAY 2005
SAINT CLAIR SHORES DRAIN SITE
ST. CLAIR SHORES, MICHIGAN

Sample location								
NEW Number								
Sample Interval								
Date		10-May-05	10-May-05	10-May-05	10-May-05	10-May-05	10-May-05	10-May-05
PARAMETERS								
Aroclor - 1016								
Aroclor - 1221								
Aroclor - 1232								
Aroclor - 1242								
Aroclor - 1248								
Aroclor - 1254								
Aroclor - 1260								
TOTAL PCBS								

Notes
All PCB concentrations reported in ppm
J Analyte concentration is estimated
DL Concentration reported for a diluted sample result
TSCA Wipe Sampling Action Level: 10 ppm
Residential Direct Contact
Criteria: 1 ppm
MDEQ Part 201 Generic Residential Soil Volatilization
to Indoor Air Criteria: 2000 ppm
NA Sample analyzed by the MDEQ lab therefore SDG number does not exist
SDG - Sample Data Group

10/17/2005
Data Entered By: EM
Data Checked By: BB

TABLE 2
SUMMARY OF PCB SOIL ANALYTICAL RESULTS
U.S. EPA/MDEQ - MAY 2005
SAINT CLAIR SHORES DRAIN SITE
ST. CLAIR SHORES, MICHIGAN

Sample location	SCH - 842 (1.5 - 2')S	SCH - 843 (1 - 1.5')S	SCH - 843 (8 - 9')S	SCH - 843 (12 - 13')S	SCH - 844 (2 - 4')S	SCH-844 (2-4')DUP - 1	SCH - 844 (11 - 12')S	SCH - 845 (1.5 - 2.5')S
SDG Number	FI00C4	FI00C4	FI00C4	FI00C4	FI00G1	FI00G1	FI00G1	FI00G1
Sample Interval	1.5 - 2'	1 - 1.5'	8 - 9'	12 - 13'	2 - 4'	NA	11 - 12'	1.5 - 2.5'
Date	24-May-05	24-May-05	24-May-05	24-May-05	24-May-05	24-May-05	24-May-05	24-May-05
PARAMETERS								
Aroclor - 1016	-	-	-	-	-	-	-	-
Aroclor - 1221	-	-	-	-	-	-	-	-
Aroclor - 1232	-	-	-	-	-	-	-	-
Aroclor - 1242	-	-	-	-	-	-	-	-
Aroclor - 1248	0.35	0.036 J	-	0.039	-	-	-	-
Aroclor - 1254	0.2	0.027J	-	-	-	-	-	-
Aroclor - 1260	0.014J	-	-	-	-	-	-	-
TOTAL PCBS	0.564J	0.063J	-	0.039	-	-	-	-

Notes:
All PCB concentrations reported in ppm.
J - Analyte concentration is estimated.
DL - Concentration reported is a diluted sample result.
TSCA Waste Characterization Level: 50 ppm
MDEQ Part 201 Generic Residential Direct Contact Criteria: 4 ppm
MDEQ Part 201 Generic Residential Soil Volatilization to Indoor Air Criteria: 3000 ppm
NA - Sample analyzed by the MDEQ lab, therefore, SDG number does not exist.
SDG - Sample Data Group

10/17/2005
Data Entered By: EM
Data Checked By: BB

TABLE 2
SUMMARY OF PCB SOIL ANALYTICAL RESULTS
U.S. EPA/MDEQ - MAY 2006
SAINT CLAIR SHORES DRAIN SITE
ST. CLAIR SHORES, MICHIGAN

Sample Location	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
MDEQ Number	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Sample Interval	[illegible]	NA	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Date	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
PARAMETERS								
Aroclor - 1016	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Aroclor - 1221	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Aroclor - 1232	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Aroclor - 1242	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Aroclor - 1248	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Aroclor - 1254	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Aroclor - 1260	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
TOTAL PCBS	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Notes
All PCB concentrations reported in ppm
J - Analyte concentration is estimated
DL - Concentration reported is a diluted sample result
TSCA Waste Characterization Level- 50 ppm
Residential Direct Contact
Criteria- 4 ppm
MDEQ Part 201 Generic Residential Soil Volatilization
to Indoor Air Criteria- 2000 ppm
NA - Sample analyzed by the MDEQ lab, therefore SDG number does not exist
SDG - Sample Data Group

10/17/2006
Data Entered By: EM
Data Checked By: BB

TABLE 2
SUMMARY OF PCB SOIL ANALYTICAL RESULTS
U.S. EPA/MDEQ - MAY 2005
SAINT CLAIR SHORES DRAIN SITE
ST. CLAIR SHORES, MICHIGAN

Sample location	SCH - 049 (4 - 8')S	SCH - 049 (12 - 13')S	SCH - 050 (1 - 2')S	SCH - 050 (12 - 13')S	SCH - 051 (1.5 - 2.5')S	SCH - 051 (9 - 10')S	SCH-051 (9-10')SDUP-18	SCH - 051 (12 - 13')S
SDG Number	19XJ5	B80J5	NA	NA	NA	NA	NA	NA
Sample Interval	4 - 8'	12 - 13'	1 - 2'	12 - 13'	1.5 - 2.5'	9 - 10'	9 - 10'	12 - 13'
Date	25-May-05	25-May-05	25-May-05	25-May-05	26-May-05	26-May-05	26-May-05	26-May-05
PARAMETERS								
Aroclor - 1016	-	-	-	-	-	-	-	-
Aroclor - 1221	-	-	-	-	-	-	-	-
Aroclor - 1232	-	-	-	-	-	-	-	-
Aroclor - 1242	-	-	-	-	-	-	-	-
Aroclor - 1248	-	0.88 DL	-	0.53	-	-	-	-
Aroclor - 1254	-	0.41 J	-	-	-	-	-	-
Aroclor - 1260	-	0.0457	-	-	-	-	-	-
TOTAL PCBS	-	1.3357	-	0.53	-	-	-	-

Notes:
All PCB concentrations reported in ppm.
J - Analyte concentration is estimated.
DL - Concentration reported is a diluted sample result.
TSCA Waste Characterization Level: 50 ppm
MDEQ Part 201 Generic Residential Direct Contact Criteria: 4 ppm
MDEQ Part 201 Generic Residential Soil Volatilization to Indoor Air Criteria: 3000 ppm
NA - Sample analyzed by the MDEQ lab, therefore, SDG number does not exist.
SDG - Sample Data Group

10/17/2005
Data Entered By: EM
Data Checked By: BB

TABLE 2
SUMMARY OF PCB SOIL ANALYTICAL RESULTS
U.S. EPA/MDEQ - MAY 2006
SAINT CLAIR SHORES DRAIN SITE
ST. CLAIR SHORES, MICHIGAN

Sample location	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
SDG Number	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Sample Interval	[illegible]	[illegible]	NA	[illegible]	NA	[illegible]	NA	[illegible]
Date	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
PARAMETERS								
Aroclor - 1016	-	-	-	-	-	-		
Aroclor - 1221	-	-	-	-	-	-	-	
Aroclor - 1232	-	-	-	-	-	-	-	
Aroclor - 1242	-	-				-	-	
Aroclor - 1248	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Aroclor - 1254	[illegible]	[illegible]	[illegible]	-			-	[illegible]
Aroclor - 1260	[illegible]	[illegible]	[illegible]					
TOTAL PCBS	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Notes

All PCB concentrations reported in ppm

J - Analyte concentration is estimated

DL - Concentration reported is a diluted sample result

TSCA Waste Characterization Level 50 ppm

MDEQ Part 201 Generic Residential Direct Contact Criteria 4 ppm

MDEQ Part 201 Generic Residential Soil Volatilization to Indoor Air Criteria [illegible] ppm

NA - Sample analyzed by the MDEQ lab therefore, SDG number does not exist

SDG - Sample Data Group

TABLE 2
SUMMARY OF PCB SOIL ANALYTICAL RESULTS
U.S. EPA/MDEQ - MAY 2005
SAINT CLAIR SHORES DRAIN SITE
ST. CLAIR SHORES, MICHIGAN

Sample location	SCR-068 (3-6")S/DUP - 16	SCR - 069 (9 - 12")S	SCR-069 (9-12")S/DUP - 17	SCR - 069 (12 - 15')S	SCR - 077 (6 - 9')S	SCR - 077 (9 - 12")S	SCR - 078 (6 - 9')S	SCR - 078 (9 - 12")S
SDG Number	I00G11	I00J5	I00G11	I00J5	I00J5	I00J5	I00J5	I00J5
Sample Interval	NA	9 - 12'	NA	12 - 15'	6 - 9'	9 - 12'	6 - 9'	9 - 12'
Date	24-May-05	24-May-05	24-May-05	24-May-05	25-May-05	25-May-05	25-May-05	25-May-05
PARAMETERS								
Aroclor - 1016	-	-	-	-	-	-	-	-
Aroclor - 1221	-	-	-	-	-	-	-	-
Aroclor - 1232	-	-	-	-	-	-	-	-
Aroclor - 1242	-	-	-	-	-	-	-	-
Aroclor - 1248	0.2	-	0.062	-	-	-	6.5 DL	2.4 DL
Aroclor - 1254	0.039 J	0.036J	0.047J	0.024J	-	-	2.9 DL	0.88 DL
Aroclor - 1260	-	-	-	-	-	-	0.14 J	0.054J
TOTAL PCBS	**0.239J**	**0.036J**	**0.109J**	**0.024J**	-	-	**9.54 J**	**3.334J**

Notes:
All PCB concentrations reported in ppm.
J - Analyte concentration is estimated.
DL - Concentration reported is a diluted sample result.
TSCA Waste Characterization Level: 50 ppm

MDEQ Part 201 Generic Residential Direct Contact Criteria: 4 ppm
MDEQ Part 201 Generic Residential Soil Volatilization to Indoor Air Criteria: 3000 ppm
NA - Sample analyzed by the MDEQ lab, therefore, SDG number does not exist.
SDG - Sample Data Group

10/17/2006
Data Entered By: EM
Data Checked By: BB

TABLE 2
SUMMARY OF PCB SOIL ANALYTICAL RESULTS
U.S. EPA/MDEQ - MAY 2006
SAINT CLAIR SHORES DRAIN SITE
ST. CLAIR SHORES, MICHIGAN

	Sample Location	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	MDEQ Number	[illegible]	[illegible]	[illegible]	[illegible]	NA	NA	NA	NA
	Sample Interval	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	Date	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
PARAMETERS									
Aroclor - 1016		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Aroclor - 1221		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Aroclor - 1232		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Aroclor - 1242		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Aroclor - 1248		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Aroclor - 1254		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Aroclor - 1260		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
TOTAL PCBS		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Notes:
All PCB concentrations reported in ppm
J - Analyte concentration is estimated
DL - Concentration reported is a diluted sample result
TACLA means Characterization Level: 50 ppm
Residential Direct Contact
Criteria: 4 ppm
MDEQ Part 201 Generic Residential Soil Volatilization
to Indoor Air Criteria: 3000 ppm
NA - Sample analyzed by the MDEQ lab therefore SDG number does not exist
SDG - Sample Data Group

TABLE 2
SUMMARY OF PCB SOIL ANALYTICAL RESULTS
U.S. EPA/MDEQ - MAY 2005
SAINT CLAIR SHORES DRAIN SITE
ST. CLAIR SHORES, MICHIGAN

Sample location	SCH - 083 (6 - 9')S	SCH - 083 (9 - 12')S	SCH - 084 (3 - 6')S	SCH - 084 (6 - 9')S	SCH - 084 (9 - 12')S	SCH - 085 (3 - 6')S	SCH - 085 (6 - 9')S	SCH - 085 (9 - 12')S	SCH - 085 (12 - 15')S
SDG Number	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sample Interval	6 - 9'	9 - 12'	3 - 6'	6 - 9'	9 - 12'	3 - 6'	6 - 9'	9 - 12'	12 - 15'
Date	26-May-05	26-May-05	26-May-05	26-May-05	26-May-05	26-May-05	26-May-05	26-May-05	26-May-05
PARAMETERS									
Aroclor - 1016	-	-	-	-	-	-	-	-	-
Aroclor - 1221	-	-	-	-	-	-	-	-	-
Aroclor - 1232	-	-	-	-	-	-	-	-	-
Aroclor - 1242	-	-	-	-	-	-	-	-	-
Aroclor - 1248	-	-	-	-	27	12	26	12	25
Aroclor - 1254	-	-	-	-	-	-	-	-	-
Aroclor - 1260	-	-	-	-	-	-	-	-	-
TOTAL PCBS	-	-	-	-	27	13	26	13	25

Notes:
All PCB concentrations reported in ppm.
J - Analyte concentration is estimated.
DL - Concentration reported is a diluted sample result.
TSCA Waste Characterization Level: 50 ppm
Residential Direct Contact
Criteria: 4 ppm
MDEQ Part 201 Generic Residential Soil Volatilization
to Indoor Air Criteria: 3000 ppm
NA - Sample analyzed by the MDEQ lab, therefore, SDG number does not exist.
SDG - Sample Data Group

10/17/2006
Data Entered By: EM
Data Checked By: BR

TABLE 3
SUMMARY OF VOC SOIL ANALYTICAL RESULTS
U.S. EPA/MDEQ - MAY 2005
SAINT CLAIR SHORES DRAIN SITE
ST. CLAIR SHORES, MICHIGAN

Sample Location	SCS - 001 (4.5 - 9)S	SCS - 001 (9 - 12)S	SCS - 001 (12 - 13.5)S	SCS - 030 (0 - 3)S	SCS - 034 (4 - 5)S	SCS - 047 (10 - 11)S	DUP - 1SV00	SCS - 048 (2 - 3)S
SDG Number	E0021	E0021	E0021	E0021	E0021	E00J7	E00J5	E00J5
Sample Interval	4.5 - 9'	9 - 12'	12 - 13.5'	0 - 3'	4 - 5'	10 - 11'		2 - 3'
Parameters Date	17-May-05	17-May-05	17-May-05	17-May-05	17-May-05	25-May-05	25-May-05	25-May-05
(ppm)								
Acetone	-	-	-	-	-	0.009J	-	-

Notes:
ppm - parts per million
J - Result is estimated
SDG - Sample Data Group

10/17/2005
Data Entered By: EM
Data Checked By: BB

TABLE 3
SUMMARY OF VOC SOIL ANALYTICAL RESULTS
U.S. EPA/MDEQ - MAY 2005
SAINT CLAIR SHORES DRAIN SITE
ST. CLAIR SHORES, MICHIGAN

Sample Location	SCS - 001 (4.5 - 9)S	SCS - 001 (9 - 12)S	SCS - 001 (12 - 13.5)S	SCS - 030 (0 - 3)S	SCS - 034 (4 - 5)S	SCS - 047 (10 - 11)S	DUP - 1SV00	SCS - 048 (2 - 3)S
SDG Number	E0021	E0021	E0021	E0021	E0021	E00J7	E00J5	E00J5
Sample Interval	4.5 - 9'	9 - 12'	12 - 13.5'	0 - 3'	4 - 5'	10 - 11'		2 - 3'
Parameters Date	17-May-05	17-May-05	17-May-05	17-May-05	17-May-05	25-May-05	25-May-05	25-May-05
(ppm)								
Acetone	-	-	-	-	-	0.009J	-	-

Notes:
ppm - parts per million
J - Result is estimated
SDG - Sample Data Group

10/17/2005
Data Entered By: EM
Data Checked By: BB

TABLE 4
SUMMARY OF PCB WATER ANALYTICAL RESULTS
U.S. EPA/MDEQ - MAY 2005
SAINT CLAIR SHORES DRAIN SITE
ST. CLAIR SHORES, MICHIGAN

Sample Location	Part 201 Residential and Commercial I			SCS - 022 - 023 (JK - 1)W	SCS - 041(7 - 9')W	SCS - SUMPPUMP - 2
SDG Number	Groundwater Surface Water Interface Criteria	Groundwater Volatilization to Indoor Air Criteria	Groundwater Contact Criteria	E00A6	E00A6	E00A6
Sample Interval				NA	7 - 9'	NA
Date				19-May-05	20-May-05	20-May-05
PARAMETER						
Aroclor - 1016	-	-	-	-	-	-
Aroclor - 1221	-	-	-	-	-	-
Aroclor - 1232	-	-	-	-	-	-
Aroclor - 1242	-	-	-	-	-	-
Aroclor - 1248	-	-	-	3.4	1.6	0.00025J
Aroclor - 1254	-	-	-	-	-	-
Aroclor - 1260	-	-	-	0.11	-	-
TOTAL PCBS	**0.0002**	**0.045**	**0.0033**	**3.5**	**1.6**	**0.00025**

Notes:
All PCB concentrations reported in ppm.

J - Analyte concentration is estimated.

DL - Concentration reported is a diluted sample result.

SDG - Sample Data Group

TABLE 4
SUMMARY OF PCB WATER ANALYTICAL RESULTS
U.S. EPA/MDEQ - MAY 2005
SAINT CLAIR SHORES DRAIN SITE
ST. CLAIR SHORES, MICHIGAN

Sample Location	Part 201 Residential and Commercial I			SCS - SUMPPUMP - 3	DUP - 2W	SCS - 044 (12 - 16')W	DUP - 1W
SDG Number	Groundwater Surface Water Interface Criteria	Groundwater Volatilization to Indoor Air Criteria	Groundwater Contact Criteria	E00A6	E00A6	E00A6	E00A5
Sample Interval				NA	NA	12 - 16'	NA
Date				20-May-05	24-May-05	20-May-05	19-May-05
PARAMETER							
Aroclor - 1016	-	-	-	-	-	-	-
Aroclor - 1221	-	-	-	-	-	-	-
Aroclor - 1232	-	-	-	-	-	-	-
Aroclor - 1242	-	-	-	-	-	-	-
Aroclor - 1248	-	-	-	-	-	-	0.0021J
Aroclor - 1254	-	-	-	-	-	-	-
Aroclor - 1260	-	-	-	-	-	-	-
TOTAL PCBS	**0.0002**	**0.045**	**0.0033**	**-**	**-**	**-**	**0.0021**

Notes:
All PCB concentrations reported in ppm.
J - Analyte concentration is estimated.
DL - Concentration reported is a diluted sample result.
SDG - Sample Data Group

Notes:
All PCB concentrations reported in ppm.
J - Analyte concentration is estimated.
DL - Concentration reported is a diluted sample result.
SDG - Sample Data Group

TABLE 4
SUMMARY OF PCB WATER ANALYTICAL RESULTS
U.S. EPA/MDEQ - MAY 2005
SAINT CLAIR SHORES DRAIN SITE
ST. CLAIR SHORES, MICHIGAN

Sample Location	Part 201 Residential and Commercial I			SCS - 022 (15 - 18')W	SCS - 025 (6 - 9')W	SCS - SUMPPUMP - 1
SDG Number	Groundwater Surface Water Interface Criteria	Groundwater Volatilization to Indoor Air Criteria	Groundwater Contact Criteria	E00A5	E00A5	E00A5
Sample Interval				15 - 18'	6 - 9'	NA
Date				19-May-05	20-May-05	19-May-05
PARAMETER						
Aroclor - 1016	-	-	-	-	-	-
Aroclor - 1221	-	-	-	-	-	-
Aroclor - 1232	-	-	-	-	-	-
Aroclor - 1242	-	-	-	-	-	-
Aroclor - 1248	-	-	-	0.0019	17	-
Aroclor - 1254	-	-	-	-	-	-
Aroclor - 1260	-	-	-	-	0.68	-
TOTAL PCBS	**0.0002**	**0.045**	**0.0033**	**0.0019**	**18**	-

Notes:
All PCB concentrations reported in ppm.
J - Analyte concentration is estimated.
DL - Concentration reported is a diluted sample result.
SDG - Sample Data Group

Notes:
All PCB concentrations reported in ppm.
J - Analyte concentration is estimated.
DL - Concentration reported is a diluted sample result.
SDG - Sample Data Group

TABLE 5
SUMMARY OF VOC WATER ANALYTICAL RESULTS
U.S. EPA/MDEQ - MAY 2005
SAINT CLAIR SHORES DRAIN SITE
ST. CLAIR SHORES, MICHIGAN

Sample Location / SDG Number / Sample Interval / Parameters / Date	Part 201 Residential and Commercial I: Groundwater Surface Water Interface Criteria	Part 201 Residential and Commercial I: Groundwater Volatilization to Indoor Air Criteria	Part 201 Residential and Commercial I: Groundwater Contact Criteria	SCS - 022 (15 - 18)W E00A6 15 - 18' 19-May-05	SCS - 025 (6 - 9)W E00A6 6 - 9' 20-May-05	SCS - 041 (7 - 9)W E00A6 7 - 9' 20-May-05	DUP - 1WVOC E00A6 24-May-05	SCS - 044 (12 - 16)W E00A6 12 - 16' 24-May-05	Trip Blank 1 E00A6 19-May-05	Trip Blank 2 E00A6 20-May-05	Trip Blank 3 E00A6 24-May-05
Acetone	**1.70**	*1,000,000 (D, S)*	31,000	0.0031J	0.0077	0.048J	0.0057	0.0064	0.004J	0.0037J	0.0042J
Benzene	**0.2 (X)**	*5.60*	11	0.00018J	-	0.00046J	-	0.00012J	-	-	-
Bromodichloromethane	**ID**	*4.80*	14	-	-	0.0019J	-	-	-	-	-
2 - Butanone	**2.20**	*240,000 (S)*	240,000 (S)	-	-	0.012J	-	-	-	-	-
Carbon Disulfide	**ID**	*250*	1,200 (S)	-	0.00043J	0.00025J	-	0.00054	-	-	-
Chloroform	**0.170 (X)**	*28*	150	-	-	0.0032	-	-	-	-	-
Cyclohexane	**NA**	*NA*	NA	-	-	-	-	*0.00017J*	-	-	-
Dibromochloromethane	**ID**	*14*	18	-	-	0.00070J	-	-	-	-	-
1,3 - Dichlorobenzene	**0.038**	*ID*	2	-	0.00068	-	-	-	-	-	-
1,4 - Dichlorobenzene	**0.013**	*16*	6.4	-	0.00085	-	-	-	-	-	-
Dichlorofluoromethene	**ID**	*220*	300 (S)	-	0.00029J	-	-	-	-	-	-
Ethylbenzene	**0.018**	*110*	170 (S)	-	-	0.00010J	-	-	-	-	-
Methylene Chloride	**0.94 (X)**	*220*	220	-	-	0.00025J	-	-	0.00026J	0.00026J	0.00028J
Trichloroethene	**0.20 (X)**	*15*	22	0.00049J	-	-	-	-	-	-	-
Toluene	**0.14**	*530*	530 (S)	*0.00019J*	*0.00030J*	*0.00066J*	*0.00016J*	*0.00029J*	-	*0.00015J*	*0.00018J*
Tetrachloroethene	**0.045 (X)**	*25*	12	0.00014J	0.00012J	-	-	-	-	-	-
1,2,4 - Trichlorobenzene	**0.03**	*300 (S)*	19	-	0.00033J	-	-	-	-	-	-

Notes:
Criteria based on MDEQ - Part 201 Generic Cleanup Criteria and Screening Levels, December 10, 2004
All concentrations reported in ppm.
J - Result is estimated.
- - Analyte was not detected.
ID - Insufficient data to develop criteria.
NA - Criteria is not available.
D - Calculated criterion exceeds 100 percent, hence it is reduced to 100 percent or 1,000,000 ppm.
S - Criterion defaults to the hazardous substance - specific water solubility limit.
X - GSI criterion shown in the generic cleanup criteria tables not protective for surface water that is used as a drinking water source.
SDG - Sample Data Group

TABLE 6

IDENTIFICATION AND SCREENING OF TECHNOLOGIES
SAINT CLAIR SHORES DRAIN SOURCE REMEDIATION
ST. CLAIR SHORES, MACOMB COUNTY, MICHIGAN

General Response Action	Remedial Technology Type	Technology Process Options	Description	Screening Results
No Action	No Additional Action	No Action	Provides a baseline comparison.	Retained
Institutional Controls	Deed Restrictions	Land Use Restrictions	Restrict the property to a specific use. A majority of the effected area contains constructed city and county roads and will be unlikely to be further developed. Deed restriction on private property would be difficult to enforce.	Eliminated
	Access Restrictions	Fencing, signs, etc.	Potentially applicable with other remedial technologies for immediate short term and long term protection of human health.	Retained
Containment	Capping	Clay/Asphaltic/Concrete	Majority of effected area is capped by existing concrete and asphaltic roads, parking areas, and other development etc. Additional capping material or capped area would not prevent further migration of contaminants into the 10 mile drain corridor. Capping of surface soil contaminants would prevent exposure, however surface soils contamination is on private property which would make maintenance of the cap difficult. Deed restrictions would be required on the private property which would be difficult to implement.	Eliminated
	Hydraulic Barriers	Extraction Wells	Extraction wells would be placed in the vicinity of the 10 mile drain corridor and would be pumped at a rate to change the hydraulic gradient, thus creating a hydraulic barrier to prevent further contaminant migration. Extracted groundwater would require onsite treatment or offsite disposal.	Retained
Treatment	*In Situ* Physical/Chemical Processes	Soil Washing	Solvents and/or surfactants are injected into the subsurface to extract contaminants. The solvent is then recovered and treated. Low permeability soils located at the site would impede the ability of the solvents and/or surfactants coming into contact with the contaminant, resulting in reduce effectiveness. Numerous applications of solvents and/or surfactants would be required thus extending the time frame to reach cleanup goals.	Eliminated
		Solidification/Stabilization	Solidification and stabilization agents (portland cement, cement kiln dust or fly ash) are injected into the subsurface in proper portion and mixed with the soil using backhoes for surface mixing or auger for deep mixing. The contaminants are encapsulated reducing the mobility of the PCBs but does not concentrate nor destroy them. Technology not practical due to the number of utilities in the impacted area.	Eliminated
		Vitrification	Electrodes are inserted into the ground at a desired treatment depth. An electric current flows through the electrodes and generates heat, melting the soil which typically melts at 1,100 degrees Celsius. The soil solidifies into vitrified monoliths upon cooling. Off gas collection systems are generally necessary. Technology would effect the geotechnical properties of the subsurface causing subsidence of the existing roadways. Technology may also damage the existing utilities in the area.	Eliminated

TABLE 6

IDENTIFICATION AND SCREENING OF TECHNOLOGIES
SAINT CLAIR SHORES DRAIN SOURCE REMEDIATION
ST. CLAIR SHORES, MACOMB COUNTY, MICHIGAN

General Response Action	Remedial Technology Type	Technology Process Options	Description	Screening Results
Treatment (continued)	*In Situ* : Physical/Chemical Processes (continued)	Chemical Oxidation	A blend of catalysts and oxidizers are injected into the subsurface to oxidize contaminants. Low permeability soils located at the site would impede the ability of the catalysts and oxidizers from coming into contact with the contaminant, resulting in reduce effectiveness. Numerous applications of the oxidants would be required thus, extending the time frame to reach cleanup goals.	Eliminated
	In Situ: Biological Processes	Bioremediation	Using indigenous or exogenous bacteria, bioremediation techniques attempt to optimize the microorganisms ability to breakdown the contaminants. PCBs may degraded anerobically, aerobically or through a combination of the two. However, PCBs biodegrade at a very slow rate requiring a longer time to reach cleanup goals.	Eliminated
		Natural Attenuation	Natural processes such as dilution, dispersion, volatilization, biodegradation, adsorption, and chemical reactions with subsurface materials reduce contaminant concentrations. Can be effective for VOCs and SVOCs. Longer time required to achieve cleanup criteria.	Eliminated
		Phytoremediation	Uses plants to remove, stabilize, and destroy organic and inorganic contaminants in groundwater. Only effective for shallow groundwater. Area requiring treatment is well developed containing concrete and asphalt roads and parking lots.	Eliminated
	Ex Situ : Chemical/Physical Processes	Offsite Incineration	Waste is subjected to temperatures typically greater than 1,000 degrees Fahrenheit in the presence of oxygen to cause volatilization, combustion and destruction of the contaminants. Nearest offsite incinerator capable of accepting the wastes from the 10 mile drain site is in Coffeyville, Kansas. Would not be cost effective technology due to transportation costs.	Eliminated
		Onsite Thermal Desorption	Waste is subjected to temperatures typically between 300 degrees Fahrenheit and 1,000 degrees Fahrenheit. Contaminants are volatilized but typically not oxidize nor destroyed. Would require a large amount of space for material handling. Not cost effective for the amount of waste material at the ten mile drain site.	Eliminated
		Chemical Dehalogenation	Contaminated soil is mixed with sodium bicarbonate in the amount of 10 percent of the weight of the contaminated material. The mixed material is heated for approximately 1 hour at 630 degrees Fahrenheit in a rotary reactor. PCBs are completely dechlorinated and partially volatilized. Requires a large amount of area for material handling. Contaminated soils will require screening, mixing and stockpiling. A large area will be required to implement the technology. Not cost effective for the amount of waste at the site.	Eliminated

TABLE 6

IDENTIFICATION AND SCREENING OF TECHNOLOGIES
SAINT CLAIR SHORES DRAIN SOURCE REMEDIATION
ST. CLAIR SHORES, MACOMB COUNTY, MICHIGAN

General Response Action	Remedial Technology Type	Technology Process Options	Description	Screening Results
Treatment (continued)	*In Situ* : Physical/Chemical Processes (continued)	Solvent Extraction	Solvent extraction does not destroy waste but is a physical means of separating contaminants from soil and sediments. Contaminated soils will require screening and processing. The soils may need to be made into a slurry by the addition of solvent and water to promote pumping of the mixture. A solvent is added to the soils and processed in an extractor where the pressure or the temperature of the moisture is changed causing the contaminants to separate from the solvent. Further treatment of the extract containing concentrated contaminants and water would be required. Would require a large area for material handling. Not cost effective for the amount of waste at the Site.	Eliminated
		Soil Washing	Water based remedial technology that mechanically mixes, washes, and rinses soil to remove contaminants. Contaminated soil is mixed with wash water and possibly surfactants to remove contaminants from soil and transfer them to the extraction fluid. The soil and wash water are then separated, and the soil is rinsed with clean water. Water used in the solid washing process requires treatment. Vapor treatment may be needed to control air emissions during material handling. Would require a large area for material handling. Not cost effective for the amount of waste at the Site.	Eliminated
	Ex Situ Biological Processes	Land farming/composting	Involves piling contaminated soil in heaps with aeration being accomplished by pulling a vacuum through the heap. Composting is a thermophilic process that involves the co-storage of contaminated soil with building agents, such as chopped hay or wood chips. Requires a large area for material handling. Time required to reach clean up goals would be greater than with other technologies.	Eliminated
Disposal	Off-site Landfill	Type II Landfill	Soils with PCBs less than 50 ppm would be transported and disposed at a Type II landfill in southeast Michigan	Retained
		TSCA Permitted Landfill	Soils with PCBs greater than 500 ppm would be excavated from the site and transported to the Wayne Disposal, Inc landfill in Belleville, Michigan.	Retained

TABLE 7

ALTERNATIVE 2 COSTS
LIMITED EXCAVATION/OFFSITE DISPOSAL AND STORM SEWER RESTORATION

Tasks	Quantity	Units	Unit Cost ($/unit)	Total Cost ($)
Capital Costs				
Site Mobilization/Preparation	1	Lump Sum	$10,000.00	$10,000
Disposal of Surface Soil Near SCS-017				
Excavation, Handling, Waste Characterization	830	cubic yards	$11.50	$9,545
Soil disposed as a TSCA Characteristic Waste	830	tons	$120.00	$99,600
Soil disposed as a non TSCA Waste (in Type II Landfill)	270	tons	$17.50	$4,725
Backfill	830	cubic yards	$7.50	$6,225
Site Restoration (revegetation)	7,500	square feet	$0.04	$300
Verification Sample Analysis	15	each	$65.00	$975
Disposal of Surface Soil Near SCS-016 and SCS-030				
Excavation, Handling, Waste Characterization	1,740	cubic yards	$11.50	$20,010
Soil disposed as a non TSCA Waste (Type II Landfill)	2,260	tons	$17.50	$39,550
Backfill	1,740	cubic yards	$7.50	$13,050
Site Restoration	7,850	square feet	$0.04	$314
Verification Samples	15	each	$65.00	$975
Storm Sewer Restoration				
Cleaning of Storm sewer Pipes 48 inch diam	505	linear feet	$30.00	$15,150
Cleaning of Storm sewer Pipes 15 inch diam	140	linear feet	$20.00	$2,800
Cleaning of Storm sewer Pipes 66 inch diam	350	linear feet	$30.00	$10,500
Disposal of standing water in storm sewer system	55,600	gallons	$0.40	$22,240
Disposal of sediments and debris in storm sewer system	98	tons	$120.00	$11,760
Excavation to Expose Manholes	37	cubic yards	$11.50	$426
Disposal of Soils Near Exposed Manholes	48	tons	$17.50	$840
Liner installation 48 inch diam. Pipe	*505*	*linear feet*	$265.00	$133,825
Liner installation 15 inch diam. Pipe	140	linear feet	$140.00	$19,600
Liner installation 66 inch diam. Pipe	350	linear feet	$550.00	$192,500
Manhole reconstruction	2	each	$600.00	$1,200
Manhole restoration	120	square feet	$15.00	$1,800
Junction box restoration	30	square feet	$15.00	$450
Asphalt Pavement Restoration	22	square yard	$31.00	$682
Demobilization	1	each	$8,000.00	$8,000
CAPITAL SUBTOTAL				**$627,042**
Bid Contingencies (10%)	10%			**$62,704**
Scope Contingencies (25%)	25%			**$156,760**
CONSTRUCTION TOTAL				**$846,506**
Permitting and Legal (5%)	5%			**$42,325**
Construction Services (15%)	15%			**$126,976**
IMPLEMENTATION TOTAL				**$1,015,807**
ENGINEERING DESIGN	8%			**$81,265**
TOTAL ESTIMATED CAPITAL COST				**$1,097,072**
TOTAL ESTIMATED PRESENT WORTH				**$1,097,000**

TABLE 8

ALTERNATIVE 3 COSTS
LIMITED EXCAVATION/OFFSITE DISPOSAL AND HYDRAULIC CONTAINMENT

Tasks	Quantity	Units	Unit Cost ($/unit)	Total Cost ($)
Capital Costs				
Site Mobilization/Preperation	1	Lump Sum	$4,000 00	$4,000
Disposal of Surface Soil Near SCS-017				
Excavation, Handling, Waste Characterization	830	cubic yards	$11.50	$9,545
Soil disposed as a TSCA Characteristic Waste	810	tons	$120 00	$97,200
Soil disposed as a non TSCA Waste (in Type II Landfill)	270	tons	$17.50	$4,725
Backfill	830	cubic yards	$7.50	$6,225
Site Restoration (revegetation)	7,500	square feet	$0 04	$300
Verification Sample Analysis	15	each	$65.00	$975
Disposal of Surface Soil Near SCS-016 and SCS-030				
Excavation, Handling, Waste Characterization	1,740	cubic yards	$11.50	$20,010
Soil disposed as a non TSCA Waste (Type II Landfill)	2,260	tons	$17.50	$39,550
Backfill	1,740	cubic yards	$7 50	$13,050
Site Restoration	7,850	square feet	$0 04	$314
Verification Samples	15	each	$65.00	$975
Hydraulic Containment				
Monitoring Well Installation	90	linear feet	$45.00	$4,050
Extraction Well Installation	60	linear feet	$120.00	$7,200
Pilot Tests/Drawdown Evaluation	1	Lump Sum	$24,000 00	$24,000
Treatment Building and Equipment	1	lump sum	$33,000 00	$33,000
Site Restoration				
Installation of concrete pavement	270	square yard	$33 50	$9,045
Installation of asphaltic pavement	90	square yard	$31 00	$2,790
Revegetation	15	square yard	$0.35	$5
Demobilization	1	each	$2,000 00	$2,000
CAPITAL SUBTOTAL				**$278,959**
Bid Contingencies (10%)	10%			**$27,896**
Scope Contingencies (25%)	25%			**$69,740**
CONSTRUCTION TOTAL				**$376,595**
Permitting and Legal (5%)	5%			**$18,830**
Construction Services (15%)	15%			**$56,489**
IMPLEMENTATION TOTAL				**$451,914**
ENGINEERING DESIGN	8%			**$36,153**
TOTAL ESTIMATED CAPITAL COST				**$488,067**
Annual O&M Costs				
Monitoring Well Sampling	24	each	65.00	$1,560
Treatment System Sampling	36	each	65.00	$2,340
Carbon Change Outs	6	each	1,200.00	$7,200
Site Visits	104	each	320.00	$33,280
Electrical	1	lump sum	2,000.00	$2,000
Equipment Repair/Replacement	1	lump sum	1,500.00	$1,500
SUBTOTAL				**$47,880**
Administrative Services	15%			$7,182
Contingency	25%			$11,970
TOTAL ANNUAL O&M COSTS				**$67,032**
TOTAL PRESENT WORTH O&M COSTS				**$1,287,499**
(5% Interest for 30 years, assume $2,000 increase per year)				
TOTAL ESTIMATED PRESENT WORTH				**$1,885,899**

TABLE 9

ALTERNATIVE 4 COSTS
EXPANDED EXCAVATION/OFFSITE DISPOSAL AND STORM SEWER RESTORATION

Tasks	Quantity	Units	Unit Cost ($/unit)	Total Cost ($)
Capital Costs				
Site Mobilization/Preparation	1	Lump Sum	$15,000.00	$15,000
Disposal of Surface Soil Near SCS-017				
Excavation, Handling, Waste Characterization	830	cubic yards	$11.50	$9,545
Soil disposed as a TSCA Characteristic Waste	810	tons	$120.00	$97,200
Soil disposed as a non TSCA Waste (in Type II Landfill)	270	tons	$17.50	$4,725
Backfill	830	cubic yards	$7.50	$6,225
Site Restoration (revegetation)	7,500	square feet	$0.04	$300
Verification Sample Analysis	15	each	$65.00	$975
Disposal of Surface Soil Near SCS-016 and SCS-030				
Excavation, Handling, Waste Characterization	1,740	cubic yards	$11.50	$20,010
Soil disposed as a non TSCA Waste (Type II Landfill)	2,260	tons	$17.50	$39,550
Backfill	1,740	cubic yards	$7.50	$13,050
Site Restoration	7,850	square feet	$0.04	$314
Verification Samples	15	each	$65.00	$975
Storm Sewer Restoration				
Cleaning of Storm sewer Pipes 48 inch diam	505	linear feet	$30.00	$15,150
Cleaning of Storm sewer Pipes 15 inch diam	140	linear feet	$20.00	$2,800
Cleaning of Storm sewer Pipes 66 inch diam	350	linear feet	$30.00	$10,500
Disposal of standing water in storm sewer system	55,600	gallons	$0.14	$7,784
Disposal of sediments and debrief in storm sewer system	98	tons	$120.00	$11,760
Excavation to Expose Manholes	37	cubic yards	$11.50	$426
Disposal of Soils Near Exposed Manholes	48	tons	$17.50	$840
Liner installation 48 inch diam. Pipe	505	linear feet	$265.00	$133,825
Liner installation 15 inch diam. Pipe	140	linear feet	$140.00	$19,600
Liner installation 66 inch diam. Pipe	350	linear feet	$550.00	$192,500
Manhole reconstruction	2	each	$600.00	$1,200
Manhole restoration	120	square feet	$15.00	$1,800
Junction box restoration	30	square feet	$15.00	$450
Asphalt Pavement Restoration	22	square yard	$31.00	$682
Disposal of Soil In Utility Corridor				
Shoring	18,900	square feet	$10.15	$191,835
Asphalt Road Demolition and Disposal	9,360	square feet	$0.80	$7,488
Concrete Road Demolition and Disposal	6,300	square feet	$1.15	$7,245
Excavation, Handling Waste Characterization	4,500	cubic yards	$11.50	$51,750
Soils Removed by Hand Excavation	500	cubic yards	$74.80	$37,400
Soil disposed as a TSCA Characteristic Waste	400	tons	$120.00	$48,000
Soil disposed as a non TSCA Waste (in Type II Landfill)	5,850	tons	$17.50	$102,375
Infiltration water removal and disposal	30,000	gallons	$0.40	$12,000
Backfill	5,000	cubic yards	$7.50	$37,500
Verification Sample Analysis	60	each	$65.00	$3,900
Site Restoration				
Installation of concrete pavement	700	square yard	$33.50	$23,450
Installation of asphaltic pavement	1,040	square yard	$31.00	$32,240
Installation of curbing	640	linear feet	$4.45	$2,848
Revegetation	125	square yard	$0.35	$44
Demobilization	1	each	$8,000.00	$8,000
CAPITAL SUBTOTAL				**$1,173,260**
Bid Contingencies (10%)	10%			**$117,326**
Scope Contingencies (25%)	25%			**$293,315**
CONSTRUCTION TOTAL				**$1,583,901**
Permitting and Legal (5%)	5%			**$79,195**
Construction Services (15%)	15%			**$237,585**
IMPLEMENTATION TOTAL				**$1,900,682**
ENGINEERING DESIGN	8%			**$152,055**
TOTAL ESTIMATED CAPITAL COST				**$2,052,736**
TOTAL ESTIMATED PRESENT WORTH				**$2,053,000**

TABLE 10

ALTERNATIVE 5 COSTS
EXPANDED EXCAVATION/OFFSITE DISPOSAL AND REPLACEMENT OF UTILITIES

Tasks	Quantity	Units	Unit Cost ($/unit)	Total Cost ($)
Capital Costs				
Site Mobilization/Preparation	1	Lump Sum	$30,000.00	$30,000
Disposal of Surface Soil Near SCS-017				
Excavation, Handling, Waste Characterization	830	cubic yards	$11.50	$9,545
Soil disposed as a TSCA Characteristic Waste	810	tons	$120.00	$97,200
Soil disposed as a non TSCA Waste (in Type II Landfill)	270	tons	$17.50	$4,725
Backfill	830	cubic yards	$7.50	$6,225
Site Restoration (revegetation)	7,500	square yard	$0.35	$2,625
Verification Sample Analysis	15	each	$65.00	$975
Disposal of Surface Soil Near SCS-016 and SCS-030				
Excavation, Handling, Waste Characterization	1,740	cubic yards	$11.50	$20,010
Soil disposed as a non TSCA Waste (Type II Landfill)	2,260	tons	$17.50	$39,550
Backfill	1,740	cubic yards	$7.50	$13,050
Site Restoration	7,850	square feet	$0.04	$314
Verification Samples	15	each	$65.00	$975
Installation of Temporary Utilities				
Installation of Temporary Water Utility	400	linear feet	$16.50	$6,600
Installation of Temporary Stormwater Holding Ponds	925	cubic yards	$11.50	$10,638
Soil disposed as a non TSCA Waste (Type II Landfill)	1,200	tons	$17.50	$21,000
Infiltration water removal and disposal	20,000	gallons	$0.14	$2,800
Installation of Temporary Sewer Connections	1,200	linear feet	$6.50	$7,800
Disposal of Soil in Utility Corridor				
Shoring	18,900	square feet	$10.15	$191,835
Asphalt Road Demolition and Disposal	9,360	square feet	$0.80	$7,488
Concrete Road Demolition and Disposal	7,550	square feet	$1.15	$8,683
Pipe Demolition 66" Diameter	315	linear feet	$13.30	$4,190
Pipe Demolition 48" Diameter	160	linear feet	$12.25	$1,960
Pipe Demolition 24" Diameter	630	linear feet	$8.50	$5,355
Pipe Demolition 15" Diameter	50	linear feet	$7.80	$390
Disposal of standing water in storm sewer system	56,600	gallons	$0.14	$7,784
Disposal of sediments and debris in storm sewer system	98	tons	$120.00	$11,760
Excavation, Handling Waste Characterization	5,000	cubic yards	$11.50	$57,500
Soil/Piping Debris disposed as a TSCA Waste	530	tons	$120.00	$63,600
Soil/Piping Debris disposed as a non TSCA Waste	5,850	tons	$17.50	$102,375
Infiltration water removal and disposal	30,000	gallons	$0.40	$12,000
Backfill	5,925	cubic yards	$7.50	$44,438
Verification Sample Analysis	60	each	$65.00	$3,900
Utility Replacement				
66" Diameter Storm Sewer (concrete)	315	linear feet	$200.00	$63,000
48" Diameter Storm Sewer (concrete)	160	linear feet	$110.00	$17,600
15" Diameter Storm Sewer (concrete)	70	linear feet	$25.00	$1,750
24" Diameter Sanitary Sewer (concrete)	630	linear feet	$55.00	$34,650
12" PVC Water Line	495	linear feet	$35.00	$17,325
Junction Box	1	each	$15,000.00	$15,000
Manholes	4	each	$3,500.00	$14,000
Site Restoration				
Installation of concrete pavement	700	square yard	$33.50	$23,450
Installation of asphaltic pavement	1,040	square yard	$31.00	$32,240
Installation of curbing	640	linear feet	$4.45	$2,848
Revegetation	125	square yard	$0.35	$44
Demobilization	1	each	$12,000.00	$12,000
CAPITAL SUBTOTAL				**$1,031,186**
Bid Contingencies (10%)	10%			$103,119
Scope Contingencies (25%)	25%			$257,798
CONSTRUCTION TOTAL				**$1,392,113**
Permitting and Legal (5%)	5%			$69,606
Construction Services (15%)	15%			$208,817
IMPLEMENTATION TOTAL				**$1,670,535**
ENGINEERING DESIGN	8%			$133,643
TOTAL ESTIMATED CAPITAL COST				**$1,804,178**
TOTAL ESTIMATED PRESENT WORTH				**$1,804,000**

APPENDIX A

Stratigraphic Boring Logs

DEQ Remediation and Redevelopment Division

SITE: 10 MILE DRAIN

BORING/WELL: MSB-1

BOREHOLE LOG

MERA #: 500736

County: Macomb
Township: St. Clair Shores
Town: T1N
Range: R13E
Section: 22
Location: North of Harper Auto Electric

Date: April 4, 2005
Driller: Robert Bishoff
Logged By: Ian Halbeisen
Drill Method: Geoprobe Macro-Soil Sampler
Total Depth: 16 feet

CONSTRUCTION	LITHOLOGY	DESCRIPTION	DEPTH	SAMPLES TYPE	SAMPLES #	FIELD RESULTS Micro-Rip ppm 0 50 100 200	GAS CHROMATOGRAPH
		Ground Surface	0				LABORATORY RESULTS
		TOPSOIL Clayey loam, moist, dark brown to black.					
		SAND Sand, fine to medium grained, some silt and pebbles, moist, dark brown.			1 - 1.5'		27,000 ppb PCB
		CLAY Clay with some silt, occasional pebbles, hard, crumbly, dry, brown and gray mottling.					
			5		7 - 8'		non-detect
					8 - 9'		100,000 ppb PCB
		SAND Sand, fine to medium grained, occasional pebbles, dry, medium brown.					
		CLAY Clay with some silt, occasional pebbles, hard, crumbly, dry, brown and gray mottling.	10				
					11 - 12'		non-detect
		CLAY Clay with some silt, occasional pebbles, dense, crumbly, dry, brown.					
		CLAY Clay, pliable, occasional pebbles, moist, gray					
			15		15.5-16'		120 ppb PCB
		End of Borehole					

DATUM: Not available
GRD. ELE.: Not available
T.O.C.: Not applicable
S.W.L.: Not available
CASING TYPE: none
SCREEN TYPE: none
WELL DEPTH: Not applicable
COMPLETION NOTES: Plugged with granular Bentonite

SAMPLE LEGEND

Grab | Split Spoon | Screw Auger | No Recovery | Rock Core | Water

LATITUDE: 42.486867904
LONGITUDE: -82.869855053
DATUM: NAD-83 Michigan GeoRef
NORTHING: 219901.1 meters
EASTING: 754686.5 meters

DEQ Remediation and Redevelopment Division

SITE: 10 MILE DRAIN

BORING/WELL: MSB-2

BOREHOLE LOG

MERA #: 500736

County: Macomb
Township: St. Clair Shores
Town: T1N
Range: R13E
Section: 22
Location: *NW corner of Harper Auto Electric*

Date: April 4, 2005
Driller: Robert Bishoff
Logged By: Ian Halbeisen
Drill Method: Geoprobe Macro-Soil Sampler
Total Depth: 15 feet

CONSTRUCTION	LITHOLOGY	DESCRIPTION	DEPTH	SAMPLES TYPE	SAMPLES ID.	FIELD RESULTS Micro-tip ppm 0 50 100 200	FIELD RESULTS GAS CHROMATOGRAPH
		Ground Surface	0				LABORATORY RESULTS
		TOPSOIL Clayey loam, moist, dark brown to black.					
		SAND Sand, fine to medium grained, some silt and pebbles, moist, dark brown.			0.5 - 1'		19,000 ppb PCB
		CLAY Clay with some silt, occasional pebbles, hard, crumbly, dry, brown and gray mottling.	5				
		SAND Sand, fine to medium grained, occasional pebbles, dry, medium brown.			8 - 8.5'		440 ppb PCB
		CLAY Clay with some silt, occasional pebbles, hard, crumbly, dry, grayish brown.	10		11-11.5'		non-detect
		CLAY Clay with some silt, occasional pebbles, hard, crumbly, dry, olive.					
		CLAY *Clay, pliable, gray clay in lengthwise contact with olive colored clay.*	15		14-14.5'		non-detect
		End of Borehole					

DATUM: Not available
GRD. ELE.: Not available
T.O.C.: Not applicable
S.W.L.: Not available
CASING TYPE: none
SCREEN TYPE: none
WELL DEPTH: Not applicable
COMPLETION NOTES: Plugged with granular Bentonite

SAMPLE LEGEND

Grab | Split Spoon | Screened Auger | No Recovery | Rock Core | Water

LATITUDE: 42.486896024
LONGITUDE: -82.899202810
DATUM: NAD-83 Michigan GeoRef
NORTHING: 219903.7 meters
EASTING: 754674.3 meters

DEQ Remediation and Redevelopment Division

SITE: 10 MILE DRAIN

BORING/WELL: MSB-3

BOREHOLE LOG

MERA #: 500736

County: Macomb
Township: St. Clair Shores
Town: T1N
Range: R13E
Section: 22
Location: NE corner of Bon Brae and Harper

Date: April 4, 2005
Driller: Robert Bishoff
Logged By: Ian Halbeisen
Drill Method: Geoprobe Macro-Soil Sampler
Total Depth: 16 feet

CONSTRUCTION	LITHOLOGY	DESCRIPTION	DEPTH	SAMPLES TYPE	SAMPLES ID	FIELD RESULTS Micro-dip ppm 0 50 100 200	FIELD RESULTS GAS CHROMATOGRAPH
		Ground Surface	0				LABORATORY RESULTS
		TOPSOIL and FILL Two clayey loam topsoil horizons with sand and clay fill sandwiched between horizons.					
		CLAY Clay with some silt, a sand seam, occasional pebbles, dense, crumbly, dry, brown and gray mottling. Fine to medium grained sand seam at 3.5 to 3.7 feet. Sand is brown and dry			1 - 2'		non-detect
					3.5 - 4'		non-detect
			5				
					8 - 9'		non-detect
		SAND Sand, fine to medium grained, dry but clay contact above sand is wet, medium brown.					
		CLAY Clay with some silt, occasional pebbles, hard, crumbly, mostly dry, brown.	10				
					12 - 13'		160 ppb PCB
		SAND Sand, fine to medium grained, wet, brown.					
		CLAY Clay with some silt, occasional pebbles, hard, crumbly, dry, brown to olive.					
			15		15.5-16'		non-detect
		CLAY Clay, pliable, occasional pebbles, moist, gray					
		End of Borehole					

DATUM: not available
GRD. ELE.: not available
T.O.C.: not applicable
S.W.L.: not available
CASING TYPE: none
SCREEN TYPE: none
WELL DEPTH: not applicable
COMPLETION NOTES: Plugged with granular Bentonite

SAMPLE LEGEND

Grab | Split Spoon | Screen Auger | No Recovery | Rock Core | Water

LATITUDE: 42.486703478
LONGITUDE: -82.898611637
DATUM: NAD-83 Michigan GeoRef
NORTHING: 219884.2 meters
EASTING: 754723.6 meters

SHEET: 1 of 1

DEQ Remediation and Redevelopment Division

SITE: 10 MILE DRAIN

BORING/WELL: MSB-4

BOREHOLE LOG

MERA #: 500736

County: Macomb
Township: St. Clair Shores
Town: T1N
Range: R13E
Section: 22
Location: North of BP gas station

Date: April 4, 2005
Driller: Robert Bishoff
Logged By: Ian Halbeisen
Drill Method: Geoprobe Macro-Soil Sampler
Total Depth: 16 feet

CONSTRUCTION	LITHOLOGY	DESCRIPTION	DEPTH	SAMPLES TYPE	SAMPLES ID	FIELD RESULTS Micro-tip ppm 0 50 100 200	FIELD RESULTS GAS CHROMATOGRAPH
		Ground Surface	0				LABORATORY RESULTS
		TOPSOIL Clayey loam, moist, dark brown to black.			1'		430 ppb PCB
		CLAY Clay with some silt, occasional pebbles, hard, crumbly, dry, brown and gray mottling.	5				
					7 - 8'		non-detect
			10				
					11.5-12'		non-detect
		CLAY Clay with some silt, occasional pebbles, hard, crumbly, dry, brown.					
		CLAY *Clay, pliable, occasional pebbles, moist, gray.*	15				
					15 - 16'		non-detect
		End of Borehole					

DATUM: not available
GRD. ELE.: not available
T.O.C.: not applicable
S.W.L.: not available
CASING TYPE: none
SCREEN TYPE: none
WELL DEPTH: not applicable
COMPLETION NOTES: Plugged with granular Bentonite

SAMPLE LEGEND

Grab | Split Spoon | Screened Auger | No Recovery | Rock Core | Water

LATITUDE: 42.486421602
LONGITUDE: -82.898324522
DATUM: NAD-83 Michigan GeoRef
NORTHING: 219853.8 meters
EASTING: 754748.4 meters

DEQ Remediation and Redevelopment Division

SITE: 10 MILE DRAIN

BORING/WELL: MSB-5

BOREHOLE LOG

MERA #: 500736

County: Macomb
Township: St. Clair Shores
Town: T1N
Range: R13E
Section: 22
Location: NW of BP gas station

Date: April 5, 2005
Driller: Robert Bishoff
Logged By: Ian Halbeisen
Drill Method: Geoprobe Macro-Soil Sampler
Total Depth: 16 feet

CONSTRUCTION	LITHOLOGY	DESCRIPTION	DEPTH	SAMPLES: TYPE	SAMPLES: ID	FIELD RESULTS: Micro-dip (ppm)	GAS CHROMATOGRAPH
		Ground Surface	0				LABORATORY RESULTS
		TOPSOIL Clayey loam, moist, dark brown to black.					
		CLAY Clay, dry, black to greenish gray.			1 - 1.5'		non-detect
		CLAY Clay with some silt, occasional pebbles, dry, greenish gray and olive mottling.			3 - 4'		non-detect
		CLAY Clay with some silt, occasional pebbles, hard, crumbly, dry, brown and gray mottling.	5		7 - 8'		non-detect
		CLAY Clay with some silt, occasional pebbles, hard, crumbly, dry, brown.	10		11-11.5'		non-detect
		CLAY Clay with some silt, occasional pebbles, hard, dry, grayish brown.					
		CLAY Clay, pliable, occasional pebbles, moist, gray.	15		15 - 16'		non-detect
		End of Borehole					

DATUM: not available
GRD. ELE.: not available
T.O.C.: not applicable
S.W.L.: not available
CASING TYPE: none
SCREEN TYPE: none
WELL DEPTH: not applicable
COMPLETION NOTES: Plugged with granular Bentonite

SAMPLE LEGEND

Grab | Split Spoon | Solid Stem Auger | No Recovery | Rock Core | Wash

LATITUDE: 42.486401627
LONGITUDE: -82.898721061
DATUM: NAD-83 Michigan GeoRef
NORTHING: 219850.3 meters
EASTING: 754715.9 meters

SHEET: 1 of 1

DEQ Remediation and Redevelopment Division

SITE: 10 MILE DRAIN

BORING/WELL: MSB-6

BOREHOLE LOG

MERA #: 500736

County: Macomb
Township: St. Clair Shores
Town: T1N
Range: R13E
Section: 22
Location: NW of BP gas station

Date: April 5, 2005
Driller: Robert Bishoff
Logged By: Ian Halbeisen
Drill Method: Geoprobe Macro-Soil Sampler
Total Depth: 16 feet

CONSTRUCTION	LITHOLOGY	DESCRIPTION	DEPTH	SAMPLES TYPE	SAMPLES ID.	FIELD RESULTS Micro-tip ppm 0 50 100 200	FIELD RESULTS GAS CHROMATOGRAPH
		Ground Surface	0				*LABORATORY RESULTS*
		TOPSOIL Clayey loam, moist, dark brown to black.					
		SAND *Sand, fine grained, dry, yellowish brown to olive brown.*			0.5 - 1'		non-detect
		CLAY Clay with some silt, occasional pebbles, hard, crumbly, dry, brown and gray mottling.	5				
		SAND Sand, fine to medium grained, wet, brown.			8.5 - 9'		non-detect
		CLAY Clay with some silt, occasional pebbles, hard, dry, brown with gray mottling.	10				
		CLAY Clay, pliable, occasional pebbles, moist, gray.	15		15 - 16'		non-detect
		End of Borehole					

DATUM: not available
GRD. ELE.: not available
T.O.C.: not applicable
S.W.L.: not available
CASING TYPE: none
SCREEN TYPE: none
WELL DEPTH: not applicable
COMPLETION NOTES: Plugged with granular Bentonite

SAMPLE LEGEND

Grab | Split Spoon | Screened Auger | No Recovery | Rock Core | Water

LATITUDE: 42.487007713
LONGITUDE: -82.899118049
DATUM: NAD-83 Michigan GeoRef
NORTHING: 219916.4 meters
EASTING: 754680.8 meters

SHEET: 1 of 1

DEQ Remediation and Redevelopment Division

SITE: 10 MILE DRAIN

BORING/WELL: MSB-7

BOREHOLE LOG

MERA #: 500736

County: Macomb
Township: St. Clair Shores
Town: T1N
Range: R13E
Section: 22
Location: Next to J.M. Olson's driveway

Date: April 5, 2005
Driller: Robert Bishoff
Logged By: Ian Halbeisen
Drill Method: Geoprobe Macro-Soil Sampler
Total Depth: 16 feet

CONSTRUCTION	LITHOLOGY	DESCRIPTION	DEPTH	SAMPLES TYPE	SAMPLES #	FIELD RESULTS Micro-Rip ppm 0 50 100 200	FIELD RESULTS GAS CHROMATOGRAPH
		Ground Surface	0				LABORATORY RESULTS
		UNKNOWN Stone blocked sampler most of the way. Only 2 to 3 inches gray clay retrieved.			0 - 0.5'		1,480 ppb PCB
		CLAY Clay with some silt, some sand, dry, greenish gray to olive.	5		4 - 4.5'		19,000 ppb PCB
		CLAY Clay with some silt, occasional pebbles, hard, crumbly, dry, brown with gray mottling			7.5 - 8'		non-detect
		CLAY Clay, pliable, occasional pebbles, dry to moist, gray.	10				
		CLAY Clay with some silt, occasional pebbles, hard, dry, brown to grayish brown.			11.5-12'		non-detect
		CLAY Clay, pliable, occasional pebbles, moist, gray					
			15		15.5-16'		non-detect
		End of Borehole					

DATUM: not available
GRD. ELE.: not available
T.O.C.: not applicable
S.W.L.: not available
CASING TYPE: none
SCREEN TYPE: none
WELL DEPTH: not applicable
COMPLETION NOTES: Plugged with granular Bentonite

SAMPLE LEGEND

Grab | Split Spoon | Screw Auger | No Recovery | Rock Core | Water

LATITUDE: 42.485588555
LONGITUDE: -82.898354634
DATUM: NAD-83 Michigan GeoRef
NORTHING: 219761.2 meters
EASTING: 754749.3 meters

SHEET: 1 of 1

DEQ Remediation and Redevelopment Division

SITE: 10 MILE DRAIN

BORING/WELL: MSB-8

BOREHOLE LOG

MERA #: 500736

County: Macomb
Township: St. Clair Shores
Town: T1N
Range: R13E
Section: 22
Location: SE corner of J.M. Olson's parking lot

Date: April 4, 2005
Driller: Robert Bishoff
Logged By: Ian Halbeisen
Drill Method: Geoprobe Macro-Soil Sampler
Total Depth: 4 feet

CONSTRUCTION	LITHOLOGY	DESCRIPTION	DEPTH	SAMPLES: TYPE	SAMPLES: ID	FIELD RESULTS: Micro-tip ppm (0 50 100 200)	FIELD RESULTS: GAS CHROMATOGRAPH
		Ground Surface	0				
		UNKNOWN Sampler retrieved 2 to 3 inches of sand and mulch on top of clay.			NS		
		End of Borehole	5				
			10				
			15				

DATUM: not available
GRD. ELE.: not available
T.O.C.: not applicable
S.W.L.: not available
CASING TYPE: none
SCREEN TYPE: none
WELL DEPTH: not applicable
COMPLETION NOTES: Plugged with granular Bentonite

SAMPLE LEGEND

Grab | Split Spoon | Screw Auger | No Recovery | Rock Core | Water

LATITUDE: 42.485571861
LONGITUDE: -82.898057405
DATUM: NAD-83 Michigan GeoRef
NORTHING: 219760.3 meters
EASTING: 754773.8 meters

DEQ Remediation and Redevelopment Division

SITE: 10 MILE DRAIN

BORING/WELL: MSB-9

BOREHOLE LOG

MERA #: 500736

County: Macomb
Township: St. Clair Shores
Town: T1N
Range: R13E
Section: 22
Location: SE corner of J.M. Olson's parking lot

Date: April 5, 2005
Driller: Robert Bishoff
Logged By: Ian Halbeisen
Drill Method: Geoprobe Macro-Soil Sampler
Total Depth: 7 feet

CONSTRUCTION	LITHOLOGY	DESCRIPTION	DEPTH	SAMPLES: TYPE	SAMPLES: Ø	FIELD RESULTS: Micro-tip (0, 50, 100, 200)	FIELD RESULTS: GAS CHROMATOGRAPH
		Ground Surface	0				LABORATORY RESULTS
		UNKNOWN Sampler retrieved 2 to 3 inches of sand and mulch on top of 2 or 3 inches of gray clay.					
					3.5 - 3.8'		5,000 ppb PCB
					3.8 - 4'		650 ppb PCB
		CLAY Clay with some silt, occasional pebbles, hard, crumbly, dry, brown with gray mottling.	5		4 - 5'		400 ppb PCB
					6 - 7'		non-detect
		End of Borehole					
			10				
			15				

DATUM: not available
GRD. ELE.: not available
T.O.C.: not applicable
S.W.L.: not available
CASING TYPE: none
SCREEN TYPE: none
WELL DEPTH: not applicable
COMPLETION NOTES: Plugged with granular Bentonite

SAMPLE LEGEND

Grab | Split Spoon | Screw Auger | No Recovery | Rock Core | Water

LATITUDE: 42.485555589
LONGITUDE: -82.898029421
DATUM: NAD-83 Michigan GeoRef
NORTHING: 219758.6 meters
EASTING: 754776.2 meters

SHEET: 1 of 1

DEQ Remediation and Redevelopment Division

SITE: 10 MILE DRAIN

BORING/WELL: MSB-10

BOREHOLE LOG

MERA #: 500736

County: Macomb
Township: St. Clair Shores
Town: T1N
Range: R13E
Section: 22
Location: Flower bed at J.M. Olson's

Date: April 5, 2005
Driller: Robert Bishoff
Logged By: Ian Halbeisen
Drill Method: Geoprobe Macro-Soil Sampler
Total Depth: 16 feet

CONSTRUCTION	LITHOLOGY	DESCRIPTION	DEPTH	SAMPLES TYPE	SAMPLES ID.	FIELD RESULTS Micro-tip ppm (0 50 100 200)	FIELD RESULTS GAS CHROMATOGRAPH
		Ground Surface	0				LABORATORY RESULTS
		TOPSOIL Clayey loam with landscaping mulch, moist, dark brown to black.					
		CLAY Clay with slag or cinder fill sandwiched between clays, dry, brown to olive.			3 - 4'		40,000 ppb PCB
		CLAY Clay with cinder or slag, dry, black.			4 - 4.5'		19,100 ppb PCB
		CLAY Clay with some silt, occasional pebbles, hard, crumbly, dry, brown and gray mottling.	5				
		CLAY Clay with some silt, occasional pebbles, hard, crumbly, dry, brown to grayish brown.	10		10 -10.5'		180 ppb PCB
		CLAY Clay with gravelly, water saturated, lenses at 12 to 12.3 feet and 13 to 13.5 feet, brown to grayish brown.			13-13.5'		5,300 ppb PCB
		CLAY Clay with some silt, occasional pebbles, hard, dry, brown.	15				
		CLAY Clay, pliable, occasional pebbles, moist, gray.					
		End of Borehole					

DATUM: not available
GRD. ELE.: not available
T.O.C.: not applicable
S.W.L.: not available
CASING TYPE: none
SCREEN TYPE: none
WELL DEPTH: not applicable
COMPLETION NOTES: Plugged with granular Bentonite

SAMPLE LEGEND

Grab | Split Spoon | Screened Auger | No Recovery | Rock Core | Water

LATITUDE: 42.486401827
LONGITUDE: -82.898721061
DATUM: NAD-83 Michigan GeoRef
NORTHING: 219850.3 meters
EASTING: 754715.9 meters

DEQ Remediation and Redevelopment Division

SITE: 10 MILE DRAIN

BORING/WELL: MSB-11

BOREHOLE LOG

MERA #: 500736

County: Macomb
Township: St. Clair Shores
Town: T1N
Range: R13E
Section: 22
Location: SW corner of J.M. Olson property

Date: April 5, 2005
Driller: Robert Bishoff
Logged By: Ian Halbeisen
Drill Method: Geoprobe Macro-Soil Sampler
Total Depth: 16 feet

CONSTRUCTION	LITHOLOGY	DESCRIPTION	DEPTH	SAMPLES TYPE	SAMPLES #	FIELD RESULTS Micro-Rp ppm 0 50 100 200	FIELD RESULTS GAS CHROMATOGRAPH
		Ground Surface	0				LABORATORY RESULTS
		TOPSOIL Clayey loam, moist, dark brown to black.					
		CLAY Clay with some silt, dry, dark gray.			0.5 - 1'		170 ppb PCB
		CLAY Clay with some silt, occasional pebbles, hard, crumbly, dry, brown and gray mottling.	5				
		CLAY Clay with some silt, occasional gravel, hard, dry, dark brown to grayish brown.	10		11 - 12'		non-detect
		CLAY Clay, sandy, dry, brown.			12.5-13'		non-detect
		CLAY Clay, pliable, occasional pebbles, moist, gray.	15		15.5-16'		non-detect
		End of Borehole					

DATUM: not available
GRD. ELE.: not available
T.O.C.: not applicable
S.W.L.: not available
CASING TYPE: none
SCREEN TYPE: none
WELL DEPTH: not applicable
COMPLETION NOTES: Plugged with granular Bentonite

SAMPLE LEGEND

Grab | Split Spoon | Solid Auger | No Recovery | Rock Core | Water

LATITUDE: 42.485808506
LONGITUDE: -82.899012813
DATUM: NAD-83 Michigan GeoRef
NORTHING: 219783.6 meters
EASTING: 754694.4 meters

SHEET: 1 of 1

DEQ Remediation and Redevelopment Division

SITE: 10 MILE DRAIN

BORING/WELL: MSB-12

BOREHOLE LOG

MERA #: 500736

County: Macomb
Township: St. Clair Shores
Town: T1N
Range: R13E
Section: 22
Location: NW corner of J.M. Olson property

Date: April 5, 2005
Driller: Robert Bishoff
Logged By: Ian Halbeisen
Drill Method: Geoprobe Macro-Soil Sampler
Total Depth: 16 feet

CONSTRUCTION	LITHOLOGY	DESCRIPTION	DEPTH	SAMPLES TYPE	SAMPLES ID	FIELD RESULTS Micro-tip ppm (0 50 100 200)	FIELD RESULTS GAS CHROMATOGRAPH
		Ground Surface	0				LABORATORY RESULTS
		UNKNOWN Only 2 or 3 inches of clay and sod retrieved.			0 - 4'		1,700 ppb PCB
		CLAY Clay, with some silt, occasional pebbles, moist to wet, olive to olive gray.	5				
		CLAY Clay, sandy, silty, occasional pebbles, soft, wet, dark gray to black.			5 - 5.5'		27,000 ppb PCB
		CLAY Clay, with some silt, occasional gravel, hard, dry, brown with gray mottling.					
		CLAY Clay, sandy, silty, soft, wet, dark gray to black. suspected to have fallen downhole from 5.5 feet.			8 - 8.5'		52,000 ppb PCB
		CLAY Clay, with some silt, occasional gravel, hard, dry, brown.	10				
		CLAY Clay, sandy, silty, soft, wet, dark gray to black. Suspected to have fallen downhole from 5.5 feet.					
		CLAY *Clay, with some silt, occasional pebbles, hard,* dry, grayish brown.					
			15		15.5-16'		non-detect
		End of Borehole					

DATUM: not available
GRD. ELE.: not available
T.O.C.: not applicable
S.W.L.: not available
CASING TYPE: none
SCREEN TYPE: none
WELL DEPTH: not applicable
COMPLETION NOTES: Plugged with granular Bentonite

SAMPLE LEGEND

Grab | Split Spoon | Screened Auger | No Recovery | Rock Core | Water

LATITUDE: 42.488124111
LONGITUDE: -82.898871659
DATUM: NAD-83 Michigan GeoRef
NORTHING: 219819.1 meters
EASTING: 754704.7 meters

DEQ Remediation and Redevelopment Division

SITE: 10 MILE DRAIN

BORING/WELL: MSB-13

BOREHOLE LOG

MERA #: 500736

County: Macomb
Township: St. Clair Shores
Town: T1N
Range: R13E
Section: 22
Location: [redacted] Bon Brae Street

Date: April 5, 2005
Driller: Robert Bishoff
Logged By: Ian Halbeisen
Drill Method: Geoprobe Macro-Soil Sampler
Total Depth: 4 feet

CONSTRUCTION	LITHOLOGY	DESCRIPTION	DEPTH	SAMPLES TYPE	SAMPLES #	FIELD RESULTS Micro-tip ppm 0 50 100 200	FIELD RESULTS GAS CHROMATOGRAPH
		Ground Surface	0				LABORATORY RESULTS
		TOPSOIL Clayey loam, dark brown to black with sandy gravel base.			0.5 - 1'		370 ppb PCB
		CLAY Clay, with some silt, occasional pebbles, hard, dry, brown and gray mottling.	5				
		End of Borehole	10				
			15				

DATUM: not available
GRD. ELE.: not available
T.O.C.: not applicable
S.W.L.: not available
CASING TYPE: none
SCREEN TYPE: none
WELL DEPTH: not applicable
COMPLETION NOTES: Plugged with granular Bentonite

SAMPLE LEGEND

Grab | Split Spoon | Screw Auger | No Recovery | Rock Core | Water

LATITUDE: 42.485795407
LONGITUDE: -82.895074616
DATUM: NAD-83 Michigan GeoRef
NORTHING: 219794.2 meters
EASTING: 755017.9 meters

SHEET: 1 of 1

DEQ Remediation and Redevelopment Division

SITE: 10 MILE DRAIN

BORING/WELL: SCS-030

BOREHOLE LOG

MERA #: 500736

County: Macomb
Township: St. Clair Shores
Town: T1N
Range: R13E
Section: 22
Location: [redacted] Bon Brae Street

Date: May 17, 2005
Driller: Robert Bishoff
Logged By: Ian Halbeisen
Drill Method: Geoprobe Macro-Soil Sampler
Total Depth: 3 feet

CONSTRUCTION	LITHOLOGY	DESCRIPTION	DEPTH	SAMPLES: TYPE	SAMPLES: ID	FIELD RESULTS: Micro-tip ppm (0 50 100 200)	FIELD RESULTS: GAS CHROMATOGRAPH
		Ground Surface	0				
		TOPSOIL Clayey loam with a little sand at the bottom, moist to wet, dark grayish brown.			0 - 3'		LABORATORY RESULTS
		NO RECOVERY Soils fell out of sampler. Complete refusal at 3 feet. Ran soil sampler in a second time and retrieved a little water.					4,600 ppb PCB
		End of Borehole	5				
			10				
			15				

DATUM: not available
GRD. ELE.: not available
T.O.C.: not applicable
S.W.L.: not available
CASING TYPE: none
SCREEN TYPE: none
WELL DEPTH: not applicable
COMPLETION NOTES: Plugged with granular Bentonite

SAMPLE LEGEND

Grab | Split Spoon | Screened Auger | No Recovery | Rock Core | Water

LATITUDE: 42.486000272
LONGITUDE: -82.893492322
DATUM: NAD-83 Michigan GeoRef
NORTHING: 219821.7 meters
EASTING: 755147.0 meters

DEQ Remediation and Redevelopment Division

SITE: 10 MILE DRAIN

BORING/WELL: SCS-031

BOREHOLE LOG

MERA #: 500736

County: Macomb
Township: St. Claire Shores
Town: T1N
Range: R13E
Section: 22
Location: Park

Date: May 18, 2005
Driller: Robert Bishoff
Logged By: Ian Halbeisen
Drill Method: Geoprobe Macro-Soil Sampler
Total Depth: 8 feet

CONSTRUCTION	LITHOLOGY	DESCRIPTION	DEPTH	SAMPLES: TYPE	SAMPLES: ID	FIELD RESULTS: Micro-tip ppm (0 50 100 200)	FIELD RESULTS: GAS CHROMATOGRAPH
		Ground Surface	0				LABORATORY RESULTS
		TOPSOIL Clayey loam with fill consisting of sand, clay, gravel and glass, dry			1 - 2'		1,127 ppb PCB
		CLAY Clay, hard, with some silt and occasional gravel, dry, brown with some gray mottling.	5				
		NO RECOVERY					
		End of Borehole	10				
			15				

DATUM: not available
GRD. ELE.: not available
T.O.C.: not applicable
S.W.L.: not available
CASING TYPE: none
SCREEN TYPE: none
WELL DEPTH: not applicable
COMPLETION NOTES: Plugged with granular Bentonite

SAMPLE LEGEND

Grab | Split Spoon | Solid Stem Auger | No Recovery | Rock Core | Water

LATITUDE: 42.485698477
LONGITUDE: -82.892340873
DATUM: NAD-83 Michigan GeoRef
NORTHING: 219791.7 meters
EASTING: 755242.9 meters

DEQ Remediation and Redevelopment Division

SITE: 10 MILE DRAIN

BORING/WELL: SCS-032

BOREHOLE LOG

MERA #: 500736

County: Macomb
Township: St. Clair Shores
Town: T1N
Range: R13E
Section: 22
Location: Park, 9 feet north of SCS-031

Date: May 18, 2005
Driller: Robert Bishoff
Logged By: Ian Halbeisen
Drill Method: Geoprobe Macro-Soil Sampler
Total Depth: 8 feet

CONSTRUCTION	LITHOLOGY	DESCRIPTION	DEPTH	SAMPLES TYPE	SAMPLES ID.	FIELD RESULTS Micro-tip ppm 0 50 100 200	FIELD RESULTS GAS CHROMATOGRAPH
		Ground Surface	0				LABORATORY RESULTS
		FILL Sand, silt and gravel fill, dry, grayish brown.					
		FILL Silt and clay fill, dry, dark brown.			1.5 - 2.5'		66 ppb PCB
		FILL Brick and concrete.					
		NO RECOVERY Recovery of soils blocked by brick in the end of the soil sampler.					
		CLAY Clay, hard, with some silt and occasional gravel, dry, brown.	5		5 - 5.5'		non-detect
		End of Borehole	10				
			15				

DATUM: not available
GRD. ELE.: not available
T.O.C.: not applicable
S.W.L.: *not available*
CASING TYPE: none
SCREEN TYPE: none
WELL DEPTH: not applicable
COMPLETION NOTES: Plugged with granular Bentonite

SAMPLE LEGEND

Grab | Split Spoon | Screened Auger | No Recovery | Rock Core | Water

LATITUDE: 42.485733171
LONGITUDE: -82.892332730
DATUM: NAD-83 Michigan GeoRef
NORTHING: 219795.6 meters
EASTING: 755243.4 meters

SHEET: 1 of 1

DEQ Remediation and Redevelopment Division

SITE: 10 MILE DRAIN

BORING/WELL: SCS-033

BOREHOLE LOG

MERA #: 500736

County: Macomb
Township: St. Clair Shores
Town: T1N
Range: R13E
Section: 22
Location: Park

Date: May 18, 2005
Driller: Robert Bishoff
Logged By: Ian Halbeisen
Drill Method: Geoprobe Macro-Soil Sampler
Total Depth: 8 feet

CONSTRUCTION	LITHOLOGY	DESCRIPTION	DEPTH	SAMPLES: TYPE	SAMPLES: ID	FIELD RESULTS: Micro-dip (ppm)	FIELD RESULTS: GAS CHROMATOGRAPH
		Ground Surface	0				LABORATORY RESULTS
		TOPSOIL Clayey loam, dark grayish brown, moist to wet, with a little sand at the bottom.					
		CLAY Clay, hard, with some silt and occasional pebbles, dry, gray to grayish brown with brown mottling					
		CLAY Clay, silty, semi-malleable, moist, dark gray			2.3 - 2.5'		1,074 ppb PCB
		NO RECOVERY					
		CLAY Clay, silty, soft, malleable, moist, brown with gray mottling	5				
		CLAY Clay, hard, with some silt and occasional pebbles, dry, brown					
		End of Borehole					
			10				
			15				

DATUM: not available
GRD. ELE.: not available
T.O.C.: not applicable
S.W.L.: not available
CASING TYPE: none
SCREEN TYPE: none
WELL DEPTH: not applicable
COMPLETION NOTES: Plugged with granular Bentonite

SAMPLE LEGEND

Grab | Split Spoon | Screened Auger | No Recovery | Rock Core | Water

LATITUDE: 42.485839584
LONGITUDE: -82.882827610
DATUM: NAD-83 Michigan GeoRef
NORTHING: 219805.9 meters
EASTING: 755202.3 meters

SHEET: 1 of 1

DEQ Remediation and Redevelopment Division

BOREHOLE LOG

MERA #: 500736

SITE: 10 MILE DRAIN

County: Macomb
Township: St. Clair Shores
Town: T1N
Range: R13E
Section: 22
Location: [redacted] Bon Brae

BORING/WELL: SCS-034

Date: May 18, 2005
Driller: Robert Bishoff
Logged By: Ian Halbeisen
Drill Method: Geoprobe Macro-Soil Sampler
Total Depth: 8 feet

CONSTRUCTION	LITHOLOGY	DESCRIPTION	DEPTH	SAMPLES TYPE	SAMPLES ID	FIELD RESULTS Micro-tip ppm (0, 50, 100, 200)	FIELD RESULTS GAS CHROMATOGRAPH
		Ground Surface	0				LABORATORY RESULTS
		TOPSOIL					
		FILL Unsorted sand, clay fill, gravel and asphalt.					
		CLAY Clay with sand and gravel and possible silt, possible fill, brown to dark gray.			1.5 - 2'		450 ppb PCB
		CLAY Clay, hard at top, more pliable with depth, dry, olive to greenish gray					
		CLAY Clay, silty with sand and fibrous material (possible roots), soft, damp to wet, dark gray to black.	5		4 - 5'		13,260 ppb PCB
		CLAY Clay, hard, with some silt, dry, dark brown					
		NO RECOVERY					
		End of Borehole	10				
			15				

DATUM: not available
GRD. ELE.: not available
T.O.C.: not applicable
S.W.L.: not available
CASING TYPE: none
SCREEN TYPE: none
WELL DEPTH: not applicable
COMPLETION NOTES: Plugged with granular Bentonite

SAMPLE LEGEND

Grab | Split Spoon | Screw Auger | No Recovery | Rock Core | Water

LATITUDE: 42.485790521
LONGITUDE: -82.895245476
DATUM: NAD-83 Michigan GeoRef
NORTHING: 219793.1 meters
EASTING: 755003.9 meters

DEQ Remediation and Redevelopment Division

SITE: 10 MILE DRAIN

BORING/WELL: SCS-035

BOREHOLE LOG

MERA #: 500736

County: Macomb
Township: St. Claire Shores
Town: T1N
Range: R13E
Section: 22
Location: Backyard of [redacted] Bon Brae

Date: May 18, 2005
Driller: Robert Bishoff
Logged By: Ian Halbeisen
Drill Method: Geoprobe Macro-Soil Sampler
Total Depth: 7.5 feet

CONSTRUCTION	LITHOLOGY	DESCRIPTION	DEPTH	SAMPLES TYPE	SAMPLES #	FIELD RESULTS Micro-Rae ppm 0 50 100 200	GAS CHROMATOGRAPH
		Ground Surface	0				LABORATORY RESULTS
		TOPSOIL					
		CLAY Clay, sandy, silty, with gravel, dry, grayish brown.			1 - 1.5'		440 ppb PCB
		CLAY Clay, hard, with some silt and occasional gravel, dry, brown.					
		CLAY Clay, silty, dry, dark gray to black.					
		NO RECOVERY			4 - 5'		152 ppb PCB
		CLAY Clay, sandy, with silt, moist, brown.	5				
		CLAY Clay, moist, gray, with silty sand seam at 4.5 feet					
		CLAY Clay, hard, with some silt and occasional gravel, dry, brown.					
		End of Borehole					
			10				
			15				

DATUM: not available
GRD. ELE.: not available
T.O.C.: not applicable
S.W.L.: not available
CASING TYPE: none
SCREEN TYPE: none
WELL DEPTH: not applicable
COMPLETION NOTES: Plugged with granular Bentonite

SAMPLE LEGEND

Grab | Split Spoon | Screw Auger | No Recovery | Rock Core | Water

LATITUDE: 42.485938157
LONGITUDE: -82.894758634
DATUM: NAD-83 Michigan GeoRef
NORTHING: 219611.0 meters
EASTING: 755043.3 meters

SHEET: 1 of 1

DEQ Remediation and Redevelopment Division

SITE: 10 MILE DRAIN

BORING/WELL: SCS-036

BOREHOLE LOG

MERA #: 500736

County: Macomb
Township: St. Clair Shores
Town: T1N
Range: R13E
Section: 22
Location: Backyard of [redacted] Lakeshore

Date: May 18, 2005
Driller: Robert Bishoff
Logged By: Ian Halbeisen
Drill Method: Geoprobe Macro-Soil Sampler
Total Depth: 12 feet

CONSTRUCTION	LITHOLOGY	DESCRIPTION	DEPTH	SAMPLES TYPE	SAMPLES ID	FIELD RESULTS Micro-tip ppm (0 50 100 200)	FIELD RESULTS GAS CHROMATOGRAPH
		Ground Surface	0				LABORATORY RESULTS
		TOPSOIL			0.5 - 1'		180 ppb PCB
		CLAY Clay, silty, dry, dark brown.			1 - 2'		527 ppb PCB
		CLAY Clay, partially malleable, dry, dark gray with greenish gray patches, pieces of wood present.					
		NO RECOVERY					
		CLAY Clay, with occasional pebbles, dry, greenish gray.	5				
		CLAY Clay, hard, with some silt and occasional gravel, dry, brown with gray mottling.					
			10				
		End of Borehole					
			15				

DATUM: not available
GRD. ELE.: not available
T.O.C.: not applicable
S.W.L.: not available
CASING TYPE: none
SCREEN TYPE: none
WELL DEPTH: not applicable
COMPLETION NOTES: Plugged with granular Bentonite

SAMPLE LEGEND

Grab | Split Spoon | Screw Auger | No Recovery | Rock Core | Water

LATITUDE: 42.485655687
LONGITUDE: -82.89687890
DATUM: NAD-83 Michigan GeoRef
NORTHING: 219773.2 meters
EASTING: 754870.3 meters

DEQ Remediation and Redevelopment Division

BOREHOLE LOG

MERA #: 500736

SITE: 10 MILE DRAIN

BORING/WELL: SCS-037

County: Macomb
Township: St. Clair Shores
Town: T1N
Range: R13E
Section: 22
Location: NE corner of J.M. Olson parking lot

Date: May 19, 2005
Driller: Robert Bishoff
Logged By: Ian Halbeisen
Drill Method: Geoprobe Macro-Soil Sampler
Total Depth: 12 feet

CONSTRUCTION	LITHOLOGY	DESCRIPTION	DEPTH	SAMPLES TYPE	SAMPLES ID	FIELD RESULTS Micro-tip ppm 0 50 100 200	FIELD RESULTS GAS CHROMATOGRAPH
		Ground Surface	0				LABORATORY RESULTS
		ASPHALT					
		FILL Sand and gravel immediately below asphalt, dark brown to black, with olive to black clay below the sand.			1.5 - 2'		1,920 ppb PCB
		FILL Pieces of slag or cinder type material, dry					
		CLAY Clay, hard, dry, dark gray to black					
		CLAY Clay, hard, dry, olive to greenish gray.			4 - 5'		920 ppb PCB
		CLAY Clay, hard, with silt and pebbles, dry, brown	5				
		End of Borehole	10				
			15				

DATUM: not available
GRD. ELE.: not available
T.O.C.: not applicable
S.W.L.: not available
CASING TYPE: none
SCREEN TYPE: none
WELL DEPTH: not applicable
COMPLETION NOTES: Plugged with granular Bentonite

SAMPLE LEGEND

Grab | Split Spoon | Screened Auger | No Recovery | Rock Core | Water

LATITUDE: 42.485885915
LONGITUDE: -82.898017866
DATUM: NAD-83 Michigan GeoRef
NORTHING: 219793.0 meters
EASTING: 754775.8 meters

SHEET: 1 of 1

DEQ Remediation and Redevelopment Division

SITE: 10 MILE DRAIN

BORING/WELL: SCS-038

BOREHOLE LOG

MERA #: 500736

County: Macomb
Township: St. Clair Shores
Town: T1N
Range: R13E
Section: 22
Location: NW corner of J.M. Olson parking lot

Date: May 19, 2005
Driller: Robert Bishoff
Logged By: Ian Halbeisen
Drill Method: Geoprobe Macro-Soil Sampler
Total Depth: 12 feet

CONSTRUCTION	LITHOLOGY	DESCRIPTION	DEPTH	SAMPLES TYPE	SAMPLES ID	FIELD RESULTS Micro-tip ppm 0 50 100 200	FIELD RESULTS GAS CHROMATOGRAPH
		Ground Surface	0				LABORATORY RESULTS
		ASPHALT					
		FILL Gravel with black sand or granular asphalt.					
		CLAY *Clay, hard, dry, dark gray to black*			1 - 2'		93 ppb PCE
		CLAY Clay, pliable, greenish gray with olive mottling.					
		CLAY Clay with silt and gravel, hard to friable, dry, brown with gray mottling.	5				
		CLAY Clay, hard, with some silt and fine pebbles, pebbles appeared to be layered, dry, brown.	10				
		CLAY Clay, hard, with some silt and occasional gravel (not layered), dry, brown					
		End of Borehole	15				

DATUM: not available
GRD. ELE.: not available
T.O.C.: not applicable
S.W.L.: not available
CASING TYPE: none
SCREEN TYPE: none
WELL DEPTH: not applicable
COMPLETION NOTES: Plugged with granular Bentonite

SAMPLE LEGEND

Grab | Split Spoon | Screened Auger | No Recovery | Rock Core | Water

LATITUDE: 42.485930491
LONGITUDE: -82.898331662
DATUM: NAD-83 Michigan GeoRef
NORTHING: 219799.2 meters
EASTING: 754749.8 meters

DEQ Remediation and Redevelopment Division

SITE: 10 MILE DRAIN

BORING/WELL: SCS-039

BOREHOLE LOG

MERA #: 500736

County: Macomb
Township: St Clair Shores
Town: T1N
Range: R13E
Section: 22
Location: [redacted] Harper Avenue

Date: May 19, 2005
Driller: Robert Bishoff
Logged By: Ian Halbeisen
Drill Method: Geoprobe Macro-Soil Sampler
Total Depth: 5.5 feet

CONSTRUCTION	LITHOLOGY	DESCRIPTION	DEPTH	SAMPLES TYPE	SAMPLES NO.	FIELD RESULTS Micro-dip ppm 0 50 100 200	GAS CHROMATOGRAPH
		Ground Surface	0				LABORATORY RESULTS
		TOPSOIL Clayey loam with a little sand at the bottom, moist to wet, dark grayish brown.					
		CLAY Clay, hard, with some silt and occasional gravel, dry, brown.					
		CLAY Clay, pliable, greenish gray Complete resistance at 5 5 feet.	5		5 - 5.5'		non-detect
		End of Borehole					
			10				
			15				

DATUM: not available
GND. ELE.: not available
T.O.C.: not applicable
S.W.L.: not available
CASING TYPE: none
SCREEN TYPE: none
WELL DEPTH: not applicable
COMPLETION NOTES: Plugged with granular Bentonite

SAMPLE LEGEND

Grab | Split Spoon | Screen Auger | No Recovery | Rock Core | Water

LATITUDE: 42.485662200
LONGITUDE: -82.899380132
DATUM: NAD-83 Michigan GeoRef
NORTHING: 219768.5 meters
EASTING: 754664.7 meters

SHEET: 1 of 1

DEQ Remediation and Redevelopment Division

SITE: 10 MILE DRAIN

BORING/WELL: SCS-040

BOREHOLE LOG

MERA #: 500736

County: Macomb
Township: St. Clair Shores
Town: T1N
Range: R13E
Section: 22
Location: [redacted] Harper Avenue

Date: May 19, 2005
Driller: Robert Bishoff
Logged By: Ian Halbeisen
Drill Method: Geoprobe Macro-Soil Sampler
Total Depth: 12 feet

CONSTRUCTION	LITHOLOGY	DESCRIPTION	DEPTH	SAMPLES TYPE	SAMPLES ID.	FIELD RESULTS Micro-tip ppm 0 50 100 200	FIELD RESULTS GAS CHROMATOGRAPH
		Ground Surface	0				LABORATORY RESULTS
		TOPSOIL					
		CLAY Clay, hard, with some silt, occasional gravel, dry, brown with gray mottling.					
		CLAY Clay, hard, dry, greenish gray.					
		CLAY Clay, dry, dark greenish gray to black.			3 - 3.5'		45 ppb PCB
		NO RECOVERY					
		CLAY Clay, moist to wet, greenish gray.	5				
		SAND Sand, fine to medium grained, saturated, greenish gray			5 - 6'		non-detect
		NO RECOVERY					
		CLAY Clay, soft, wet, greenish gray.					
		SAND Sand, fine to medium grained, wet, greenish gray.	10		9 - 9.5'		157 ppb PCB
		CLAY Clay, hard, with some silt, dry, brown					
		NO RECOVERY					
		End of Borehole	15				

DATUM: not available
GRD. ELE.: not available
T.O.C.: not applicable
S.W.L.: not available
CASING TYPE: none
SCREEN TYPE: none
WELL DEPTH: not applicable
COMPLETION NOTES: Plugged with granular Bentonite

SAMPLE LEGEND

Grab | Split Spoon | Screened Auger | No Recovery | Rock Core | Water

LATITUDE: 42.486400976
LONGITUDE: -82.899024503
DATUM: NAD-83 Michigan GeoRef
NORTHING: 219849.3 meters
EASTING: 754691.0 meters

SHEET: 1 of 1

DEQ Remediation and Redevelopment Division

SITE: 10 MILE DRAIN

BORING/WELL: SCS-041

BOREHOLE LOG

MERA #: 500736

County: Macomb
Township: St. Clair Shores
Town: T1N
Range: R13E
Section: 22
Location: East side of [redacted] Harper Avenue

Date: May 20, 2005
Driller: Robert Bishoff
Logged By: Ian Halbeisen
Drill Method: Geoprobe Macro-Soil Sampler
Total Depth: 12 feet

CONSTRUCTION	LITHOLOGY	DESCRIPTION	DEPTH	SAMPLES: TYPE	SAMPLES: ID.	FIELD RESULTS: Micro-tip (ppm)	FIELD RESULTS: GAS CHROMATOGRAPH
		Ground Surface	0				LABORATORY RESULTS
		TOPSOIL					
		CLAY Clay, moist, brown and gray.					
		FILL Gravelly sandy till wet, gray					
		NO RECOVERY					
		NO RECOVERY	5				
		SAND Sand, saturated with water and water in sampling tube on top of soil. Water sample collected by decanting off water.			4 - 6'		5,678 ppb PCB
		CLAY Clay, hard, some silt, wet, brown with gray mottling			7 - 9'		1,600 ppb PCB
		CLAY Clay, hard, with some silt and occasional gravel, dry, brown	10				
		End of Borehole					
			15				

DATUM: not available
GRD. ELE.: not available
T.O.C.: not applicable
S.W.L.: not available
CASING TYPE: none
SCREEN TYPE: none
WELL DEPTH: not applicable
COMPLETION NOTES: Plugged with granular Bentonite

SAMPLE LEGEND

Grab | Split Spoon | Screw Auger | No Recovery | Rock Core | Water

LATITUDE: 42.488498713
LONGITUDE: -82.898896735
DATUM: NAD-83 Michigan GeoRef
NORTHING: 219080.3 meters
EASTING: 754092.7 meters

SHEET: 1 of 1

DEQ Remediation and Redevelopment Division

SITE: 10 MILE DRAIN

BORING/WELL: SCS-042

BOREHOLE LOG

MERA #: 500736

County: Macomb
Township: St. Clair Shores
Town: T1N
Range: R13E
Section: 22
Location: [redacted] Harper Avenue

Date: May 24, 2005
Driller: Robert Bishoff
Logged By: Ian Halbeisen
Drill Method: Geoprobe Macro-Soil Sampler
Total Depth: 7 feet

CONSTRUCTION	LITHOLOGY	DESCRIPTION	DEPTH	SAMPLES TYPE	SAMPLES ID.	FIELD RESULTS Micro-tip ppm 0 50 100 200	FIELD RESULTS GAS CHROMATOGRAPH
		Ground Surface	0				LABORATORY RESULTS
		TOPSOIL					
		CLAY Clay, hard, with some silt, occasional gravel, dry, brown.					
		CLAY Clay, hard to firm, damp, greenish gray with some black patches.			1.5 - 2'		564 ppb PCB
		CLAY Clay, damp and sticky at 4 feet, greenish gray.	5				
		NO RECOVERY Resistance encountered at 7 feet.					
		End of Borehole	10				
			15				

DATUM: not available
GRD. ELE.: not available
T.O.C.: not applicable
S.W.L.: not available
CASING TYPE: none
SCREEN TYPE: none
WELL DEPTH: not applicable
COMPLETION NOTES: Plugged with granular Bentonite

SAMPLE LEGEND

Grab | Split Spoon | Screened Auger | No Recovery | Rock Core | Water

LATITUDE: 42.485859594
LONGITUDE: -82.899287539
DATUM: NAD-83 Michigan GeoRef
NORTHING: 219788.5 meters
EASTING: 754671.6 meters

DEQ Remediation and Redevelopment Division

SITE: 10 MILE DRAIN

BORING/WELL: SCS-043

BOREHOLE LOG

MERA #: 500736

County: Macomb
Township: St Clair Shores
Town: T1N
Range: R13E
Section: 22
Location: SW corner of Bon Brae and Harper Avenue

Date: May 24, 2005
Driller: Robert Bishoff
Logged By: Ian Halbeisen
Drill Method: Geoprobe Macro-Soil Sampler
Total Depth: 16 foot

CONSTRUCTION	LITHOLOGY	DESCRIPTION	DEPTH	SAMPLES TYPE	SAMPLES ID.	FIELD RESULTS Micro-tip ppm 0 50 100 200	FIELD RESULTS GAS CHROMATOGRAPH
		Ground Surface	0				LABORATORY RESULTS
		TOPSOIL					
		CLAY Clay, hard, with some silt and gravel, dry, brown.			1 - 1.5'		63 ppb PCB
		CLAY Clay, silty, dry, dark gray to black.					
		CLAY Clay with some silt and occasional pebbles and lenses of sandy clay, dry to moist, brown	5				
		CLAY Clay, sandy, moist to wet, brown.			8 - 9'		non-detect
		CLAY Clay, hard, some silt and gravel, dry, grayish brown	10				
		CLAY Clay, sandy, silty, wet, brown			12 - 13'		39 ppb PCB
		CLAY Clay with some silt and gravel, dry, grayish brown.					
		CLAY Clay, hard, with some silt and gravel, dry, gray.	15				
		End of Borehole					

DATUM: not available
GRD. ELE.: not available
T.O.C.: not applicable
S.W.L.: not available
CASING TYPE: none
SCREEN TYPE: none
WELL DEPTH: not applicable
COMPLETION NOTES: Plugged with granular Bentonite

SAMPLE LEGEND

Grab | Split Spoon | Screened Auger | No Recovery | Rock Core | Water

LATITUDE: 42.486778001
LONGITUDE: -82.898950925
DATUM: NAD-83 Michigan GeoRef
NORTHING: 219891.4 meters
EASTING: 754695.5 meters

DEQ Remediation and Redevelopment Division

SITE: 10 MILE DRAIN

BORING/WELL: SCS-044

BOREHOLE LOG

MERA #: 500736

County: Macomb
Township: St. Clair Shores
Town: T1N
Range: R13E
Section: 22
Location: NW corner of [redacted] Harper Avenue

Date: May 24, 2005
Driller: Robert Bishoff
Logged By: Ian Halbeisen
Drill Method: Geoprobe Macro-Soil Sampler
Total Depth: 16 feet

CONSTRUCTION	LITHOLOGY	DESCRIPTION	DEPTH	SAMPLES TYPE	SAMPLES ID.	FIELD RESULTS Micro-tip ppm 0 50 100 200	FIELD RESULTS GAS CHROMATOGRAPH
		Ground Surface	0				LABORATORY RESULTS
		TOPSOIL					
		CLAY Clay, hard, some silt and occasional gravel, dry, brown with gray to olive mottling.					
		CLAY Clay, silty, dark gray			2 - 4'		non-detect
		NO RECOVERY					
		CLAY Clay, hard, some silt, dry, brown with gray mottling.	5				
		CLAY Clay, dry to damp, gray with brown mottling.					
		NO RECOVERY					
		CLAY Clay, hard, some silt and gravel and occasional sand, dry, brown.	10				
		CLAY Clay, silty, moist to wet, gray.			11 - 12'		non-detect
		CLAY Clay, hard, with some silt and pebbles, dry, brown to grayish brown.					
			15		12 - 16		non-detect
		End of Borehole					

DATUM: not available
GRD. ELE.: not available
T.O.C.: not applicable
S.W.L.: not available
CASING TYPE: none
SCREEN TYPE: none
WELL DEPTH: not applicable
COMPLETION NOTES: Plugged with granular Bentonite

SAMPLE LEGEND

Grab | Split Spoon | Screened Auger | No Recovery | Rock Core | Water

LATITUDE: 42.487146266
LONGITUDE: -82.898415441
DATUM: NAD-83 Michigan GeoRef
NORTHING: 219933.9 meters
EASTING: 754737.9 meters

DEQ Remediation and Redevelopment Division

SITE: 10 MILE DRAIN

BORING/WELL: SCS-045

BOREHOLE LOG

MERA #: 500736

County: Macomb
Township: St. Clair Shores
Town: T1N
Range: R13E
Section: 22
Location: West side of [redacted] Harper Avenue

Date: May 24, 2005
Driller: Robert Bishoff
Logged By: Ian Halbeisen
Drill Method: Geoprobe Macro-Soil Sampler
Total Depth: 15 feet

CONSTRUCTION	LITHOLOGY	DESCRIPTION	DEPTH	SAMPLES TYPE	SAMPLES ID	FIELD RESULTS Micro-Sip ppm 0 50 100 200	FIELD RESULTS GAS CHROMATOGRAPH
		Ground Surface	0				LABORATORY RESULTS
		TOPSOIL					
		CLAY Clay, hard, some silt and gravel, dry, grayish brown.					
		CLAY Clay, dry, olive gray to black.			1.5 - 2.5'		non-detect
		CLAY Clay, hard, with some silt and gravel, dry, brown with gray mottling	5				
		NO RECOVERY					
		CLAY Clay, hard, some silt and pebbles, dry, brown.			8 - 9'		non-detect
			10				
		NO RECOVERY					
		CLAY Clay, hard, some silt and pebbles, dry, brown.					
		CLAY Clay, hard, with some silt and pebbles, dry, grayish brown.	15		14 - 15'		non-detect
		End of Borehole					

DATUM: not available
GRD. ELE.: not available
T.O.C.: not applicable
S.W.L.: not available
CASING TYPE: none
SCREEN TYPE: none
WELL DEPTH: not applicable
COMPLETION NOTES: Plugged with granular Bentonite

SAMPLE LEGEND

Grab | Split Spoon | Screened Auger | No Recovery | Rock Core | Wash

LATITUDE: 42.498916750
LONGITUDE: -82.898510752
DATUM: NAD-83 Michigan GeoRef
NORTHING: 219908.2 meters
EASTING: 754731.0 meters

SHEET: 1 of 1

DEQ Remediation and Redevelopment Division

SITE: 10 MILE DRAIN

BORING/WELL: SCS-046

BOREHOLE LOG

MERA #: 500736

County: Macomb
Township: St. Clair Shores
Town: T1N
Range: R13E
Section: 22
Location: NW corner of Bon Brae and Harper Avenue

Date: May 25, 2005
Driller: Robert Bishoff
Logged By: Ian Halbeisen
Drill Method: Geoprobe Macro-Soil Sampler
Total Depth: 1 foot

CONSTRUCTION	LITHOLOGY	DESCRIPTION	DEPTH	SAMPLES: TYPE	SAMPLES: ID	FIELD RESULTS: Micro-tip ppm (0 50 100 200)	FIELD RESULTS: GAS CHROMATOGRAPH
		Ground Surface	0				LABORATORY RESULTS
		TOPSOIL			0 - 1'		Not analyzed
		Resistance encountered at 1 foot. Reacts like concrete or hardpan. Probed with steel rod and entire corner seems underlain by resistant material.					
		End of Borehole	5				
			10				
			15				

DATUM: not available
GRD. ELE.: not available
T.O.C.: not applicable
S.W.L.: not available
CASING TYPE: none
SCREEN TYPE: none
WELL DEPTH: not applicable
COMPLETION NOTES: Plugged with granular Bentonite

SAMPLE LEGEND

Grab | Split Spoon | Screened Auger | No Recovery | Rock Core | Water

LATITUDE: 42.487029588
LONGITUDE: -82.898854747
DATUM: NAD-83 Michigan GeoRef
NORTHING: 219919.6 meters
EASTING: 754702.3 meters

DEQ Remediation and Redevelopment Division

SITE: 10 MILE DRAIN

BORING/WELL: SCS-047

BOREHOLE LOG

MERA #: 500736

County: Macomb
Township: St. Clair Shores
Town: T1N
Range: R13E
Section: 22
Location: [redacted] Harper Avenue

Date: May 25, 2005
Driller: Robert Bishoff
Logged By: Ian Halbeisen
Drill Method: Geoprobe Macro-Soil Sampler
Total Depth: 16 feet

CONSTRUCTION	LITHOLOGY	DESCRIPTION	DEPTH	SAMPLES TYPE	SAMPLES I.D.	FIELD RESULTS Micro-tip (ppm) 0 50 100 200	FIELD RESULTS GAS CHROMATOGRAPH
		Ground Surface	0				LABORATORY RESULTS
		TOPSOIL					
		CLAY Clay, with silt, dry, brown to dark grayish brown. Chunks that look like asphalt appear at 1 foot.					
		CLAY Clay, hard, with some silt and gravel, dry, brown with gray brown mottling. Lense of sandy clay at 3.3 to 3.4 feet.					
		NO RECOVERY					
		CLAY Clay, hard, some silt and gravel, dry, brown.	5				
		CLAY Clay, dry, gray to grayish brown.					
		CLAY Clay with some silt and gravel and sand, dry, brown.					
		NO RECOVERY					
		CLAY Clay, hard, some silt and gravel, dry, brown to grayish brown. Lense of sand, silt and gravel at 10.7 to 10.8 feet. Lense material is dark gray to black.	10		10 - 11'		non-detect
		CLAY Clay, semi-pliable, dry to moist, gray to grayish brown.					
		CLAY Clay, pliable, with occasional gravel, moist, gray.					
			15		15 - 16'		non-detect
		End of Borehole					

DATUM: not available
GRD. ELE.: not available
T.O.C.: not applicable
S.W.L.: not available
CASING TYPE: none
SCREEN TYPE: none
WELL DEPTH: not applicable
COMPLETION NOTES: Plugged with granular Bentonite

SAMPLE LEGEND

Grab | Split Spoon | Screw Auger | No Recovery | Rock Core | Water

LATITUDE: 42.485075936
LONGITUDE: -82.899339796
DATUM: NAD-83 Michigan GeoRef
NORTHING: 219701.3 meters
EASTING: 754670.5 meters

DEQ Remediation and Redevelopment Division

SITE: 10 MILE DRAIN

BORING/WELL: SCS-048

BOREHOLE LOG

MERA #: 500736

County: Macomb
Township: St. Clair Shores
Town: T1N
Range: R13E
Section: 22
Location: SE corner of Harper and Lakeland

Date: May 25, 2005
Driller: Robert Bishoff
Logged By: Ian Halbeisen
Drill Method: Geoprobe Macro-Soil Sampler
Total Depth: 16 feet

CONSTRUCTION	LITHOLOGY	DESCRIPTION	DEPTH	SAMPLES TYPE	SAMPLES ID	FIELD RESULTS Micro-tip ppm (0 50 100 200)	FIELD RESULTS GAS CHROMATOGRAPH
		Ground Surface	0				LABORATORY RESULTS
		TOPSOIL					
		CLAY Clay, silty, hard, dry, grayish brown to gray. Sandy at 0.9 foot and gravelly at 1.3 to 1.4 feet.			1 - 2'		non-detect
		CLAY Clay, soft to firm, silty at 2.4 to 2.6 feet, gray to gray brown.					
		CLAY Clay, hard, with some silt and gravel, dry, brown with gray mottling.					
		NO RECOVERY					
		CLAY Clay, hard, some silt and gravel, dry, brown with gray mottling.	5				
		CLAY Clay, soft, gray.					
		CLAY Clay, hard, some silt and gravel, dry, brown to grayish brown.					
			10				
			15				
		CLAY Clay, gray.			15 - 16'		non-detect
		End of Borehole					

DATUM: not available
GRD. ELE.: not available
T.O.C.: not applicable
S.W.L.: not available
CASING TYPE: none
SCREEN TYPE: none
WELL DEPTH: not applicable
COMPLETION NOTES: Plugged with granular Bentonite

SAMPLE LEGEND

Grab | Split Spoon | Screened Auger | No Recovery | Rock Core | Water

LATITUDE: 42.485499528
LONGITUDE: -82.899109707
DATUM: NAD-83 Michigan GeoRef
NORTHING: 219749.0 meters
EASTING: 754687.7 meters

DEQ Remediation and Redevelopment Division

SITE: 10 MILE DRAIN

BORING/WELL: SCS-049

BOREHOLE LOG

MERA #: 500736

County: Macomb
Township: St. Clair Shores
Town: T1N
Range: R13E
Section: 22
Location: NE corner of Harper and Bon Brae

Date: May 25, 2005
Driller: Robert Bishoff
Logged By: Ian Halbeisen
Drill Method: Geoprobe Macro-Soil Sampler
Total Depth: 16 feet

CONSTRUCTION	LITHOLOGY	DESCRIPTION	DEPTH	SAMPLES TYPE	SAMPLES ID	FIELD RESULTS Micro-tip ppm 0 50 100 200	FIELD RESULTS GAS CHROMATOGRAPH
		Ground Surface	0				LABORATORY RESULTS
		TOPSOIL Loamy topsoil and gravelly sand fill					
		CLAY Clay, hard, dry, dark gray with brown mottling			1 - 2'		49,600 ppb PCB
		CLAY Clay, hard, some silt and gravel, dry, brown					
		NO RECOVERY					
		CLAY Clay, dark gray			4 - 6'		non-detect
		SAND Sand, gravelly, possibly fell down hole	5				
		CLAY Clay, soft, dry, brown with dark gray mottling					
		NO RECOVERY					
		CLAY Clay, hard, some silt and gravel, dry, brown	10				
		CLAY Clayey silt or silty clay, soft and sticky, wet, greenish gray			12 - 13		1,335 ppb PCB
		CLAY Clay, hard, some silt and gravel, dry, brown	15				
		CLAY Clay, hard, dry, gray					
		End of Borehole					

DATUM: not available
GRD. ELE.: not available
T.O.C.: not applicable
S.W.L.: not available
CASING TYPE: none
SCREEN TYPE: none
WELL DEPTH: not applicable
COMPLETION NOTES: Plugged with granular Bentonite

SAMPLE LEGEND

Grab | Split Spoon | Screened Auger | No Recovery | Rock Core | Water

LATITUDE: 42.486567056
LONGITUDE: -82.898547907
DATUM: NAD-83 Michigan GeoRef
NORTHING: 219869.2 meters
EASTING: 754729.4 meters

DEQ Remediation and Redevelopment Division

SITE: 10 MILE DRAIN

BORING/WELL: SCS-050

BOREHOLE LOG

MERA #: 500736

County: Macomb
Township: St. Clair Shores
Town: T1N
Range: R13E
Section: 22
Location: West side of [redacted] Harper Avenue

Date: May 25, 2005
Driller: Robert Bishoff
Logged By: Ian Halbeisen
Drill Method: Geoprobe Macro-Soil Sampler
Total Depth: 16 feet

CONSTRUCTION	LITHOLOGY	DESCRIPTION	DEPTH	SAMPLES TYPE	SAMPLES ID	FIELD RESULTS Micro-tip ppm (0 50 100 200)	FIELD RESULTS GAS CHROMATOGRAPH
		Ground Surface	0				LABORATORY RESULTS
		ASPHALT, CONCRETE and GRAVEL					
		CLAY Clay, silty,semi-soft, dry, dark gray to black.			1 - 2'		non-detect
		CLAY Clay, semi-soft, dry, olive to greenish gray.					
		CLAY Clay, hard, with some silt and gravel, dry, brown with greenish gray mottling.					
		NO RECOVERY					
		CLAY Clay, hard, some silt and occasional gravel, dry, brown.	5				
		CLAY Clay, sandy with gravel, dry, grayish brown to brown.					
		CLAY Clay, some sand and silt and occasional, dry with a little water bleeding at 9.8 to 10 feet, brown.	10				
		CLAY Clay, sandy and silty, water saturated, brown.			12 - 13'		530 ppb PCB
		CLAY Clay, hard, with some silt and occasional gravel, dry, brown.					
		NO RECOVERY Sampler blocked by rock.	15				
		End of Borehole					

DATUM: not available
GRD. ELE.: not available
T.O.C.: not applicable
S.W.L.: not available
CASING TYPE: none
SCREEN TYPE: none
WELL DEPTH: not applicable
COMPLETION NOTES: Plugged with granular Bentonite

SAMPLE LEGEND

Grab | Split Spoon | Screened Auger | No Recovery | Rock Core | Water

LATITUDE: 42.486614633
LONGITUDE: -82.899419189
DATUM: NAD-83 Michigan GeoRef
NORTHING: 219871.9 meters
EASTING: 754657.7 meters

DEQ Remediation and Redevelopment Division

BOREHOLE LOG

MERA #: 500736

SITE: 10 MILE DRAIN

BORING/WELL: SCS-051

County: Macomb
Township: St. Clair Shores
Town: T1N
Range: R13E
Section: 22
Location: NW of [redacted] Harper Avenue

Date: May 26, 2005
Driller: Robert Bishoff
Logged By: Ian Halbeisen
Drill Method: Geoprobe Macro-Soil Sampler
Total Depth: 16 feet

CONSTRUCTION	LITHOLOGY	DESCRIPTION	DEPTH	SAMPLES TYPE	SAMPLES ID	FIELD RESULTS Micro-tip ppm 0 50 100 200	FIELD RESULTS GAS CHROMATOGRAPH
		Ground Surface	0				LABORATORY RESULTS
		ASPHALT					
		CLAY Clay, dry, black					
		CLAY Clay, dry, gray to greenish gray.			1.5 - 2.5'		non-detect
		CLAY Clay, hard, with some silt and occasional gravel, dry, brown with gray mottling					
		CLAY Clay, hard, some silt and occasional gravel, dry, brown	5				
		CLAY Clay, dry, dark gray to olive					
		CLAY Clay, slightly moist, brown			9 - 10'		non-detect
		SILT Silt, sandy, with pebbles, dry, dark gray to black	10				
		CLAY Clay, hard, with some silt and occasional gravel, dry, brown.					
		CLAY Clay, hard, some silt and gravel, dry, brown to grayish brown, with lense of black sand or silt at 12.3 to12.5 feet.			12 - 13'		non-detect
			15				
		End of Borehole					

DATUM: not available
GRD. ELE.: not available
T.O.C.: not applicable
S.W.L.: not available
CASING TYPE: none
SCREEN TYPE: none
WELL DEPTH: not applicable
COMPLETION NOTES: Plugged with granular Bentonite

SAMPLE LEGEND

Grab | Split Spoon | Screw Auger | No Recovery | Rock Core | Water

LATITUDE: 42.486827697
LONGITUDE: -82.899352987
DATUM: NAD-83 Michigan GeoRef
NORTHING: 219895.7 meters
EASTING: 754862.2 meters

USEPA

LOG OF BORING SCS-001

Ten Mile Drain #2 Site
St Clair Shores, Michigan
W.O.#20083.066.001.0010

Location	: St Clair Shores, MI	Checked By	: Erik Martinson
Date	: 05/17/2005		
Drilling Method	: Geoprobe		
Driller	: U.S. EPA		
Logger	: Keith Lesniak/U.S. EPA		

Depth in feet	USCS	GRAPHIC	DESCRIPTION	Sample Interval (feet)	PID (ppm)	REMARKS
0–4	SP		SAND: Light brown.		0.4	
4–9	SC		SAND: Clayey, Light brown and grey.	4.5'-9'	0.5	
9–12	CL		CLAY: Sandy, Light brown and grey, Trace gravels, wet.	9'-12'	0.4	
12–13.5	SC		SAND: Clayey, Light brown.	12'-13.5'	0.9	

E.O.B. @ 13.5 feet bgs
Work Area = 0.4 ppm

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USEPA

LOG OF BORING SCS-002

Ten Mile Drain #2 Site
St Clair Shores, Michigan
W.O.#20083.066.001.0010

Location	: St Clair Shores, MI	Checked By	: Erik Martinson
Date	: 05/17/2005		
Drilling Method	: Geoprobe		
Driller	: U.S. EPA		
Logger	: Keith Lesniak/U.S. EPA		

Depth in feet	USCS	GRAPHIC	DESCRIPTION	Sample Interval (feet)	PID (ppm)	REMARKS
0–3	CL		CLAY: Trace gravels, Sandy, Light grey and brown.		0.0	
3–6	CL		CLAY: Sandy, Trace gravels, Light grey and brown.		0.6	
6–9	SC		SAND: Clayey, Trace gravels, Light brown and grey.	6'-9'	0.5	
9–12	SC		SAND: Clayey, Trace gravels, Light brown and grey.		0.5	
12–15	CL		CLAY: Trace gravels, Light grey.	12'-15'	0.1	

E.O.B. @ 15 feet bgs
Work Area = 0.4 ppm

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USEPA

LOG OF BORING SCS-003

Ten Mile Drain #2 Site
St Clair Shores, Michigan
W.O.#20083.066.001.0010

Location	: St Clair Shores, MI	Checked By	: Erik Martinson
Date	: 05/17/2005		
Drilling Method	: Geoprobe		
Driller	: U.S. EPA		
Logger	: Keith Lesniak/U.S. EPA		

Depth in feet	USCS	GRAPHIC	DESCRIPTION	Sample Interval (feet)	PID (ppm)	REMARKS
0	SC		SAND: Clayey, Light brown.	0'-3'	0.2	Work Area = 0.2 ppm
3	SC		SAND: Clayey, Light grey.	3'-6'	0.1	
6	SC		SAND: Clayey, Trace gravels, Light brown and grey.	6'-9'	0.0	
9	SC		SAND: Clayey, Light grey and brown, wet.	9'-12'	0.1	
12	SC		SAND: Clayey, Light grey and brown, wet.	12'-15'	0.2	
15						E.O.B. @ 15 feet bgs
16						
17						

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USEPA

LOG OF BORING SCS-004

Ten Mile Drain #2 Site
St Clair Shores, Michigan
W.O.#20083.066.001.0010

Location	: St Clair Shores, MI	Checked By	: Erik Martinson
Date	: 05/17/2005		
Drilling Method	: Geoprobe		
Driller	: U.S. EPA		
Logger	: Keith Lesniak/U.S. EPA		

Depth in feet	USCS	GRAPHIC	DESCRIPTION	Sample Interval (feet)	PID (ppm)	REMARKS
0	SC		SAND: Light brown, Clayey, Light grey.		0.0	Work Area = 0.0 ppm
3	SC		SAND: Light brown, Clayey, Light grey.			
6	SC		SAND: Light brown, Wet, Clayey, Light grey.	6'-9'	0.0	
9	SC		SAND: Wet, Clay at 11'6", Light grey.	9'-12'	0.9	Work Area = 0.2 ppm
12	CL		CLAY: Light grey.		0.5	
15						E.O.B. @ 15 feet bgs
16						
17						

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USEPA

LOG OF BORING SCS-005

Ten Mile Drain #2 Site
St Clair Shores, Michigan
W.O.#20083.066.001.0010

Location	: St Clair Shores, MI	Checked By	: Erik Martinson
Date	: 05/17/2005		
Drilling Method	: Geoprobe		
Driller	: U.S. EPA		
Logger	: Keith Lesniak/U.S. EPA		

Depth in feet	USCS	GRAPHIC	DESCRIPTION	Sample Interval (feet)	PID (ppm)	REMARKS
0	CL		CLAY: Light brown, Sandy.		0.2	
3	SP		SAND: Light brown.	3'-6'	0.0	Work Area = 0.0 ppm
6	SP		SAND: Light brown.	6'-9'	0.1	
9	SP		SAND: Light brown.	9'-12'	0.0	
12	SP		SAND: Light brown.	12'-15'	0.0	
15						E.O.B. @ 15 feet bgs
16						
17						

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USEPA

LOG OF BORING SCS-006

Ten Mile Drain #2 Site
St Clair Shores, Michigan
W.O.#20083.066.001.0010

Location	: St Clair Shores, MI	Checked By	: Erik Martinson
Date	: 05/17/2005		
Drilling Method	: Geoprobe		
Driller	: U.S. EPA		
Logger	: Keith Lesniak/U.S. EPA		

Depth in feet	USCS	GRAPHIC	DESCRIPTION	Sample Interval (feet)	PID (ppm)	REMARKS
0	CL		CLAY: Light grey.	0'-3'	0.0	
3	SC		SAND: Light grey/brown, Clayey.	3'-6'	0.0	
6	SC		SAND: Light grey/brown, Clayey, Trace gravels.	6'-9'	0.0	Work Area = 0.0 ppm
9	CL		CLAY: Light grey.	9'-12'	0.0	
12						E.O.B. @ 12 feet bgs
13						
14						
15						

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USEPA

LOG OF BORING SCS-007

Ten Mile Drain #2 Site
St Clair Shores, Michigan
W.O.#20083.066.001.0010

Location	: St Clair Shores, MI	Checked By	: Erik Martinson
Date	: 05/18/2005		
Drilling Method	: Geoprobe		
Driller	: U.S. EPA		
Logger	: Keith Lesniak/U.S. EPA		

Depth in *feet*	USCS	GRAPHIC	DESCRIPTION	Sample Interval (feet)	PID (ppm)	REMARKS
0–3	SP		SAND: Light brown.	0'-3'	0.0	Work Area = 0.0 ppm
3–6	SP		SAND: Light brown/tan, medium grained.	3'-6'	0.0	
6–9	CL		CLAY: Light grey to Dark brown, Firm, Gravel inclusions.	6'-9'	0.0	
9–12	CL		CLAY: Light grey to Dark brown.	9'-12'	0.0	

E.O.B. @ 12 feet bgs

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USEPA

LOG OF BORING SCS-008

Ten Mile Drain #2 Site
St Clair Shores, Michigan
W.O.#20083.066.001.0010

Location	: St Clair Shores, MI	Checked By	: Erik Martinson
Date	: 05/18/2005		
Drilling Method	: Geoprobe		
Driller	: U.S. EPA		
Logger	: Keith Lesniak/U.S. EPA		

Depth in feet	USCS	GRAPHIC	DESCRIPTION	Sample Interval (feet)	PID (ppm)	REMARKS
0–3	SP		SAND: Brown/tan.	0'-3'	0.0	
3–6	CL		CLAY: Dark brown/tan, Sandy, Trace small gravels.	3'-6'	0.0	
6–9	CL		CLAY: Dark brown, Trace gravels.	6'-9'	0.0	

E.O.B. @ 9 feet bgs

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USEPA	LOG OF BORING SCS-009 (Page 1 of 1)

Ten Mile Drain #2 Site
St Clair Shores, Michigan
W.O.#20083.066.001.0010

Location	: St Clair Shores, MI	Checked By	: Erik Martinson
Date	: 05/18/2005		
Drilling Method	: Geoprobe		
Driller	: U.S. EPA		
Logger	: Keith Lesniak/U.S. EPA		

Depth in feet	USCS	GRAPHIC	DESCRIPTION	Sample Interval (feet)	PID (ppm)	REMARKS
0–3	CL		CLAY: Dark brown, Sandy.	0'-3'	0.0	Work Area = 0.0 ppm
3–6	CL		CLAY: Dark grey.	3'-6'	0.0	
6–9	CL		CLAY: Light and dark brown/grey.	6'-9'	0.0	
9–12	CL		CLAY: Grey.	9'-12'	0.0	
12						E.O.B. @ 12 feet bgs

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USEPA	LOG OF BORING SCS-010 (Page 1 of 1)

Ten Mile Drain #2 Site
St Clair Shores, Michigan
W.O.#20083.066.001.0010

Location	: St Clair Shores, MI	Checked By	: Erik Martinson
Date	: 05/18/2005		
Drilling Method	: Geoprobe		
Driller	: U.S. EPA		
Logger	: Keith Lesniak/U.S. EPA		

Depth in feet	USCS	GRAPHIC	DESCRIPTION	Sample Interval (feet)	PID (ppm)	REMARKS
0	CL		CLAY: Light brown/grey sand top 6", Light brown/brown/dark brown clay from 0.5' to 3'.	0'-3'	0.0	Work Area = 0.0 ppm
3	CL		CLAY: Light brown/brown/dark brown, Trace gravels.		0.0	
6						E.O.B. @ 6 feet bgs
7						
8						

09-09-2005 k:\20083066.001 Ten Mile Drain\Boring Logs\SCS-010.bor

USEPA	LOG OF BORING SCS-011 (Page 1 of 1)

Ten Mile Drain #2 Site
St Clair Shores, Michigan
W.O.#20083.066.001.0010

Location	: St Clair Shores, MI	Checked By	: Erik Martinson
Date	: 05/18/2005		
Drilling Method	: Geoprobe		
Driller	: U.S. EPA		
Logger	: Keith Lesniak/U.S. EPA		

Depth in feet	USCS	GRAPHIC	DESCRIPTION	Sample Interval (feet)	PID (ppm)	REMARKS
0–3	SP		SAND: Brown.		0.0	
3–6	CL		CLAY: Grey/brown.		0.0	
6–9	CL		CLAY: Grey/brown.			Work Area = 0.0 ppm
9						E.O.B. @ 9 feet bgs

10
11
12

08-09-2005 k:\20083066.001 Ten Mile Drain\Boring Logs\SCS-011.bor

USEPA	LOG OF BORING SCS-012 (Page 1 of 1)

Ten Mile Drain #2 Site
St Clair Shores, Michigan
W.O.#20083.066.001.0010

Location	: St Clair Shores, MI	Checked By	: Erik Martinson
Date	: 05/18/2005		
Drilling Method	: Geoprobe		
Driller	: *U.S. EPA*		
Logger	: Keith Lesniak/U.S. EPA		

Depth in feet	USCS	GRAPHIC	DESCRIPTION	Sample Interval (feet)	PID (ppm)	REMARKS
0–3	CL		CLAY:			
3–6	CL		CLAY:			
6–9	CL		CLAY: Brown/grey.	6'-9'	0.0	
9						E.O.B. @ 9 feet bgs

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USEPA

LOG OF BORING SCS-013

Ten Mile Drain #2 Site
St Clair Shores, Michigan
W.O.#20083.066.001.0010

Location	: St Clair Shores, MI	Checked By	: Erik Martinson
Date	: 05/18/2005		
Drilling Method	: Geoprobe		
Driller	: U.S. EPA		
Logger	: Keith Lesniak/U.S. EPA		

Depth in feet	USCS	GRAPHIC	DESCRIPTION	Sample Interval (feet)	PID (ppm)	REMARKS
0-3	SP		SAND: Brown/Tan.	0'-3'	0.0	Work Area = 0.0 ppm
3-6	SP		SAND: Brown.	3'-6'	0.0	
6-9	CL		CLAY: Brown, Sandy.	6'-9'	0.0	
9-12	SP		SAND: Brown, Wet.	9'-12'	0.0	
12-15	CL		CLAY: Grey.		0.0	

E.O.B. @ 15 feet bgs

09-09-2005 k:\20083066.001 Ten Mile Drain\Boring Logs\SCS-013.bor

USEPA	LOG OF BORING SCS-014 (Page 1 of 1)

Ten Mile Drain #2 Site
St Clair Shores, Michigan
W.O.#20083.066.001.0010

Location	: St Clair Shores, MI	Checked By	: Erik Martinson
Date	: 05/18/2005		
Drilling Method	: Geoprobe		
Driller	: U.S. EPA		
Logger	: Keith Lesniak/U.S. EPA		

Depth in feet	USCS	GRAPHIC	DESCRIPTION	Sample Interval (feet)	PID (ppm)	REMARKS
0-3	SP		SAND: Brown, Medium grained.			
3-6	SP		SAND: Brown, Medium grained.			
6-9	SP		SAND: Brown, Medium grained.		0.0	
9-12	SP		SAND: Brown, Medium grained, Water encountered.			
12-15	CL		CLAY: Grey, Wet.	11.5'-13'	0.0	Sand and Clay interface sampled.

E.O.B. @ 15 feet bgs

09-09-2005 k:\20083066.001 Ten Mile Drain\Boring Logs\SCS-014.bor

USEPA

LOG OF BORING SCS-015

Ten Mile Drain #2 Site
St Clair Shores, Michigan
W.O.#20083.066.001.0010

Location	: St Clair Shores, MI	Checked By	: Erik Martinson
Date	: 05/19/2005		
Drilling Method	: Geoprobe		
Driller	: U.S. EPA		
Logger	: Keith Lesniak/U.S. EPA		

Depth in feet	USCS	GRAPHIC	DESCRIPTION	Sample Interval (feet)	PID (ppm)	REMARKS
0	AR		FILL: Topsoil, Sand.			
1	CL		CLAY: Grey/ Dark brown.		0.0	Work Area = 0.0 ppm
2						
3	CL		CLAY: Grey/Dark brown.	3'-6'	0.0	
4						
5						
6						E.O.B. @ 6 feet bgs
7						
8						

09-09-2005 k:\20083066.001 Ten Mile Drain\Boring Logs\SCS-015.bor

USEPA

LOG OF BORING SCS-016

Ten Mile Drain #2 Site
St Clair Shores, Michigan
W.O.#20083.066.001.0010

Location	: St Clair Shores, MI	Checked By	: Erik Martinson
Date	: 05/19/2005		
Drilling Method	: Geoprobe		
Driller	: U.S. EPA		
Logger	: Keith Lesniak/U.S. EPA		

Depth in feet	USCS	GRAPHIC	DESCRIPTION	Sample Interval (feet)	PID (ppm)	REMARKS
0	AR		FILL: Topsoil.			Work Area = 0.0 ppm
1	CL		CLAY: Grey, Trace gravels.	0'-3'	0.0	
2						
3	CL		CLAY: Grey, Trace gravels.			
4					0.0	
5						
6	CL		CLAY: Grey, Trace gravels.			
7				7'-8'	0.0	
8						
9						E.O.B. @ 9 feet bgs
10						
11						
12						

09-09-2005 k:\20083066.001 Ten Mile Drain\Boring Logs\SCS-016.bor

USEPA

LOG OF BORING SCS-017

Ten Mile Drain #2 Site
St Clair Shores, Michigan
W.O.#20083.066.001.0010

Location	: St Clair Shores, MI	Checked By	: Erik Martinson
Date	: 05/19/2005		
Drilling Method	: *Geoprobe*		
Driller	: U.S. EPA		
Logger	: Keith Lesniak/U.S. EPA		

Depth in feet	USCS	GRAPHIC	DESCRIPTION	Sample Interval (feet)	PID (ppm)	REMARKS
0	AR		FILL: Topsoil.			
1	CL		CLAY: Light brown/Grey, Mottled, 6" topsoil inclusion.	1'-3'	0.0	
3	CL		CLAY: Brown/Grey, Trace gravels.	5'-6'	0.0	
6	CL		CLAY: Brown/Grey, Trace gravels.			
9	CL		CLAY: Brown/Grey, Trace gravels.			
12						E.O.B. @ 12 feet bgs

13
14
15

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USEPA

LOG OF BORING SCS-018

Ten Mile Drain #2 Site
St Clair Shores, Michigan
W.O.#20083.066.001.0010

Location	: St Clair Shores, MI	Checked By	: Erik Martinson
Date	: 05/19/2005		
Drilling Method	: Geoprobe		
Driller	: U.S. EPA		
Logger	: Keith Lesniak/U.S. EPA		

Depth in feet	USCS	GRAPHIC	DESCRIPTION	Sample Interval (feet)	PID (ppm)	REMARKS
0	AR		FILL: Topsoil, Light brown.		0.0	Work Area = 0.0 ppm
1	CL		CLAY: Light brown, Grades into Dark brown/Light brown mottled clay.		0.0	
3	CL		CLAY: Dark brown/Light brown, Mottled, Sandy clay layer at 3.5'.	5'-6'	0.0	
6						E.O.B. @ 6 feet bgs
7						
8						

09-09-2005 k:\20083066.001 Ten Mile Drain\Boring Logs\SCS-018.bor

USEPA

LOG OF BORING SCS-019

Ten Mile Drain #2 Site
St Clair Shores, Michigan
W.O.#20083.066.001.0010

Location	: St Clair Shores, MI	Checked By	: Erik Martinson
Date	: 05/19/2005		
Drilling Method	: Geoprobe		
Driller	: U.S. EPA		
Logger	: Keith Lesniak/U.S. EPA		

Depth in feet	USCS	GRAPHIC	DESCRIPTION	Sample Interval (feet)	PID (ppm)	REMARKS
0	SP		SAND: Dark.			Work Area = 0.0 ppm
1	CL		CLAY: Dark grey/Light brown.	1'-3'	0.0	
3	SP		SAND: Brown.			
4	CL		CLAY: Brown/Grey.	3'-6'	0.0	
6	CL		CLAY: Grey from 6'-8', Brown from 8'-9'.	6'-7'	0.0	
				8'-9'	0.0	
9	CL		CLAY: Brown.	9'-11'	0.0	
12						E.O.B. @ 12 feet bgs
13						
14						
15						

09-09-2005 k:\20083066.001 Ten Mile Drain\Boring Logs\SCS-019.bor

USEPA

LOG OF BORING SCS-020

Ten Mile Drain #2 Site
St Clair Shores, Michigan
W.O.#20083.066.001.0010

Location	: St Clair Shores, MI	Checked By	: Erik Martinson
Date	: 05/19/2005		
Drilling Method	: Geoprobe		
Driller	: U.S. EPA		
Logger	: Keith Lesniak/U.S. EPA		

Depth in feet	USCS	GRAPHIC	DESCRIPTION	Sample Interval (feet)	PID (ppm)	REMARKS
0	SP		SAND: Backfill above pipe, Light to dark brown.	0'-3'	0.0	Work Area = 0.0 ppm
3	SP		SAND: Dark stained at 4', Light brown from 5'-6'.	3'-6'	0.0	
6	SP		SAND: Light brown, wet.		0.0	
9						E.O.B. @ 9 feet bgs
10						
11						
12						

09-09-2005 k:\20083066.001 Ten Mile Drain\Boring Logs\SCS-020.bor

USEPA

LOG OF BORING SCS-021

Ten Mile Drain #2 Site
St Clair Shores, Michigan
W.O.#20083.066.001.0010

Location	: St Clair Shores, MI	Checked By	: Erik Martinson
Date	: 05/19/2005		
Drilling Method	: Geoprobe		
Driller	: U.S. EPA		
Logger	: Keith Lesniak/U.S. EPA		

Depth in feet	USCS	GRAPHIC	DESCRIPTION	Sample Interval (feet)	PID (ppm)	REMARKS
0–3	SP		SAND: Light brown, Dark brown stained from 1'-3'.	0'-3'	0.0	Work Area = 0.0 ppm
3–6	SP		SAND: Light brown.	3'-6'	0.0	
6–9	SP		SAND: Light brown.	6'-9'	0.0	

E.O.B. @ 9 feet bgs

09-09-2005 k:\20083066.001 Ten Mile Drain\Boring Logs\SCS-021.bor

USEPA

LOG OF BORING SCS-022

Ten Mile Drain #2 Site
St Clair Shores, Michigan
W.O.#20083.066.001.0010

Location	: St Clair Shores, MI	Checked By	: Erik Martinson
Date	: 05/19/2005		
Drilling Method	: Geoprobe		
Driller	: U.S. EPA		
Logger	: Keith Lesniak/U.S. EPA		

Depth in feet	USCS	GRAPHIC	DESCRIPTION	Sample Interval (feet)	PID (ppm)	REMARKS
0	SP		SAND: Dark, wet.	0'-3'	0.0	
3	SP		SAND: Light tan, wet.		0.0	
6	SP		SAND: Light tan, wet.		0.0	
9	SP		SAND: Dark brown, wet.	9'-12'	0.0	
12	CL		CLAY: Dark, Sandy, Dark.	12'-15'	0.0	
15	CL		CLAY: Grey, wet.	15'-16'	0.0	PCB and VOC water samples taken from 15'-18'.
18						E.O.B. @ 18 feet bgs
19						
20						

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USEPA

LOG OF BORING SCS-023

Ten Mile Drain #2 Site
St Clair Shores, Michigan
W.O.#20083.066.001.0010

Location	: St Clair Shores, MI	Checked By	: Erik Martinson
Date	: 05/19/2005		
Drilling Method	: Geoprobe		
Driller	: U.S. EPA		
Logger	: Keith Lesniak/U.S. EPA		

Depth in feet	USCS	GRAPHIC	DESCRIPTION	Sample Interval (feet)	PID (ppm)	REMARKS
0–3	SP		SAND: Dark brown.	0'-3'	0.0	
3–6	SP		SAND: Brown.	3'-6'	0.0	
6–9	SP		SAND: Light brown.	6'-9'	0.0	
9–12	SP		SAND: Light brown, moist.	9'-12'	0.0	

E.O.B. @ 12 feet bgs

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USEPA

LOG OF BORING SCS-024

Ten Mile Drain #2 Site
St Clair Shores, Michigan
W.O.#20083.066.001.0010

Location	: St Clair Shores, MI	Checked By	: Erik Martinson
Date	: 05/19/2005		
Drilling Method	: Geoprobe		
Driller	: U.S. EPA		
Logger	: Keith Lesniak/U.S. EPA		

Depth in feet	USCS	GRAPHIC	DESCRIPTION	Sample Interval (feet)	PID (ppm)	REMARKS
0–3	SP		SAND: Concrete from 0'-1', Dark sand from 1'-3'.		0.0	
3–6	CL		CLAY: Brown, Sandy.	4'-5'	0.0	
6–9	CL		CLAY: Grey.		0.0	
9–12	CL		CLAY: Grey, Sandy, Brown.	9'-12'	0.0	
12–15	CL		CLAY: Grey.	12'-15'	0.0	

E.O.B. @ 15 feet bgs
Work Area = 0.0 ppm

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USEPA

LOG OF BORING SCS-025

Ten Mile Drain #2 Site
St Clair Shores, Michigan
W.O.#20083.066.001.0010

Location	: St Clair Shores, MI	Checked By	: Erik Martinson
Date	: 05/20/2005		
Drilling Method	: Geoprobe		
Driller	: U.S. EPA		
Logger	: Keith Lesniak/U.S. EPA		

Depth in feet	USCS	GRAPHIC	DESCRIPTION	Sample Interval (feet)	PID (ppm)	REMARKS
0	SP		SAND: Brown, Medium grained.	1'-2'		
3	SP		SAND: Brown, Medium grained.	4'-6'		
6	SP		SAND: Brown, Medium grained, Wet.	6'-9'		PCB and VOC water samples taken from 6'-9'.
9	SP		SAND: Brown, Medium grained, Wet.			
12	SP		SAND: Brown, Medium grained, Wet, Oil sheen on water, Pea-gravel at 15'.	12'-15'		
15	CL		CLAY:	15'-16'		
18	CL		CLAY:	18'20'		
20						E.O.B. @ 20 feet bgs
21						
22						

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USEPA

LOG OF BORING SCS-026

Ten Mile Drain #2 Site
St Clair Shores, Michigan
W.O.#20083.066.001.0010

Location	: St Clair Shores, MI	Checked By	: Erik Martinson
Date	: 05/20/2005		
Drilling Method	: Geoprobe		
Driller	: U.S. EPA		
Logger	: Keith Lesniak/U.S. EPA		

Depth in feet	USCS	GRAPHIC	DESCRIPTION	Sample Interval (feet)	PID (ppm)	REMARKS
0–3	SP		SAND: Brown.	0'-2'		
3–6	SP		SAND: Brown.	5'-6'		
6–9	SP		SAND: Pea gravel from 7.5'-9'.	7.5'-9'		
9–12	GW		GRAVEL: Wet, Sandy.	9'-12'		
12–15	GC		GRAVEL: Grey clay from 13'-13.5'.	12'-13'		

E.O.B. @ 15 feet bgs

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USEPA	LOG OF BORING SCS-027 (Page 1 of 1)

Ten Mile Drain #2 Site
St Clair Shores, Michigan
W.O.#20083.066.001.0010

Location	: St Clair Shores, MI	Checked By	: Erik Martinson
Date	: 05/24/2005		
Drilling Method	: Geoprobe		
Driller	: U.S. EPA		
Logger	: Keith Lesniak/U.S. EPA		

Depth in feet	USCS	GRAPHIC	DESCRIPTION	Sample Interval (feet)	PID (ppm)	REMARKS
0	AR		CONCRETE:			Work Area = 0.0 ppm
1	SP		SAND: Light brown.		0.0	
3	SP		SAND: Light brown.	3'-6'	0.0	
6	SP		SAND: Light brown, Trace small gravels.		0.0	
9	SP		SAND: Brown, Trace small gravels.		0.0	
12	CL		CLAY: Grey/Light brown.	12'-15'	0.0	
15						E.O.B. @ 15 feet bgs
16						
17						
18						

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USEPA

LOG OF BORING SCS-028

Ten Mile Drain #2 Site
St Clair Shores, Michigan
W.O.#20083.066.001.0010

Location	: St Clair Shores, MI	Checked By	: Erik Martinson
Date	: 05/24/2005		
Drilling Method	: Geoprobe		
Driller	: U.S. EPA		
Logger	: Keith Lesniak/U.S. EPA		

Depth in feet	USCS	GRAPHIC	DESCRIPTION	Sample Interval (feet)	PID (ppm)	REMARKS
0	SP		SAND: Light brown.		0.0	Work Area = 0.0 ppm
3	SP		SAND: Light brown.		0.0	
6	SP		SAND: Light brown, Wet.	6'-9'	0.0	
9	SP		SAND: Dark brown, Wet.		0.0	
12	SP		SAND: Wet.			
13	CL		CLAY: Grey, Dark material at 13'.	12'-15'	0.1	Sand/Clay interface sampled.
15						E.O.B. @ 15 feet bgs
16						
17						
18						

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USEPA	LOG OF BORING SCS-029 (Page 1 of 1)

Ten Mile Drain #2 Site
St Clair Shores, Michigan
W.O.#20083.066.001.0010

Location	: St Clair Shores, MI	Checked By	: Erik Martinson
Date	: 05/24/2005		
Drilling Method	: Geoprobe		
Driller	: U.S. EPA		
Logger	: Keith Lesniak/U.S. EPA		

Depth in feet	USCS	GRAPHIC	DESCRIPTION	Sample Interval (feet)	PID (ppm)	REMARKS
0	SP		SAND: Light brown.			
1	CL		CLAY: Grey, Trace small gravels.		0.0	Work Area = 0.0 ppm
3	CL		CLAY: Brown/grey.		0.0	
6	CL		CLAY: Light brown/grey, Hit refusal at 9'.		0.0	
9						E.O.B. @ 9 feet bgs
10						
11						
12						

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USEPA	LOG OF BORING SCS-060 (Page 1 of 1)

Ten Mile Drain #2 Site
St Clair Shores, Michigan
W.O.#20083.066.001.0010

Location : St Clair Shores, MI
Date : 05/24/2005
Drilling Method : Geoprobe
Driller : U.S. EPA
Logger : Keith Lesniak/U.S. EPA
Checked By : Erik Martinson

Depth in feet	USCS	GRAPHIC	DESCRIPTION	Sample Interval (feet)	PID (ppm)	REMARKS
0	CL		CLAY: Grey.		0.0	Work Area = 0.0 ppm
3	CL		CLAY: Light brown/Grey.			
6	CL		CLAY: Brown/Grey, Hit refusal at 9'.			
9						E.O.B. @ 9 feet bgs
10						
11						
12						

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USEPA

LOG OF BORING SCS-061

Ten Mile Drain #2 Site
St Clair Shores, Michigan
W.O.#20083.066.001.0010

Location	: St Clair Shores, MI	Checked By	: Erik Martinson
Date	: 05/24/2005		
Drilling Method	: Geoprobe		
Driller	: U.S. EPA		
Logger	: Keith Lesniak/U.S. EPA		

Depth in feet	USCS	GRAPHIC	DESCRIPTION	Sample Interval (feet)	PID (ppm)	REMARKS
0						
1	SP		SAND: Brown.		0.0	Work Area = 0.0 ppm
2	CL		CLAY: Grey.			
3						
4	CL		CLAY: Light brown/Grey.		0.0	
5						
6						
7	CL		CLAY: Grey.		0.0	
8						
9						
10	CL		CLAY: Grey, Wet.	9'-12'	0.0	
11						
12						
13	CL		CLAY: Grey, Firm.		0.0	
14						
15						E.O.B. @ 15 feet bgs
16						
17						
18						

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USEPA	LOG OF BORING SCS-062 (Page 1 of 1)

Ten Mile Drain #2 Site
St Clair Shores, Michigan
W.O.#20083.066.001.0010

Location	: St Clair Shores, MI	Checked By	: Erik Martinson
Date	: 05/24/2005		
Drilling Method	: Geoprobe		
Driller	: U.S. EPA		
Logger	: Keith Lesniak/U.S. EPA		

Depth in feet	USCS	GRAPHIC	DESCRIPTION	Sample Interval (feet)	PID (ppm)	REMARKS
0	SC		SAND: Dark grey, Brown clay.		0.0	Work Area = 0.0 ppm
3	CL		CLAY: Grey.		0.0	
6	CL		CLAY: Grey, Hit refusal at 9'.		0.0	
9						E.O.B. @ 9 feet bgs
10						
11						
12						

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USEPA

LOG OF BORING SCS-063

Ten Mile Drain #2 Site
St Clair Shores, Michigan
W.O.#20083.066.001.0010

Location	: St Clair Shores, MI	Checked By	: Erik Martinson
Date	: 05/24/2005		
Drilling Method	: Geoprobe		
Driller	: U.S. EPA		
Logger	: Keith Lesniak/U.S. EPA		

Depth in feet	USCS	GRAPHIC	DESCRIPTION	Sample Interval (feet)	PID (ppm)	REMARKS
0	CL		CLAY: Grey, Brown sand.		0.0	Work Area = 0.0 ppm
3	CL		CLAY: Grey/Light brown.		0.0	
6	CL		CLAY: Light Grey, Brown from 7'-9'.		0.0	
9	CL		CLAY: Grey, Wet.		0.0	
12	CL		CLAY: Grey, Wet.	12'-15'	0.0	
15						E.O.B. @ 15 feet bgs
16						
17						
18						

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USEPA

LOG OF BORING SCS-064

Ten Mile Drain #2 Site
St Clair Shores, Michigan
W.O.#20083.066.001.0010

Location	: St Clair Shores, MI	Checked By	: Erik Martinson
Date	: 05/24/2005		
Drilling Method	: Geoprobe		
Driller	: U.S. EPA		
Logger	: Keith Lesniak/U.S. EPA		

Depth in feet	USCS	GRAPHIC	DESCRIPTION	Sample Interval (feet)	PID (ppm)	REMARKS
0	CL		CLAY: Grey.		0.0	Work Area = 0.0 ppm
3	CL		CLAY: Grey.		0.0	
6	CL		CLAY: Grey, Hit refusal at 8'.		0.0	
9						E.O.B. @ 9 feet bgs
10						
11						
12						

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USEPA	LOG OF BORING SCS-065 (Page 1 of 1)

Ten Mile Drain #2 Site
St Clair Shores, Michigan
W.O.#20083.066.001.0010

Location	: St Clair Shores, MI	Checked By	: Erik Martinson
Date	: 05/24/2005		
Drilling Method	: Geoprobe		
Driller	: U.S. EPA		
Logger	: Keith Lesniak/U.S. EPA		

Depth in feet	USCS	GRAPHIC	DESCRIPTION	Sample Interval (feet)	PID (ppm)	REMARKS
0	CL		CLAY: Grey, Wet.		0.0	Work Area = 0.0 ppm
3	CL		CLAY: Grey, Wet.		0.0	
6	CL		CLAY: Grey, Wet, Hit refusal at 8'.		0.0	E.O.B. @ 8 feet bgs
8						
9						
10						
11						
12						

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USEPA

LOG OF BORING SCS-066

Ten Mile Drain #2 Site
St Clair Shores, Michigan
W.O.#20083.066.001.0010

Location	: St Clair Shores, MI	Checked By	: Erik Martinson
Date	: 05/24/2005		
Drilling Method	: Geoprobe		
Driller	: U.S. EPA		
Logger	: Keith Lesniak/U.S. EPA		

Depth in feet	USCS	GRAPHIC	DESCRIPTION	Sample Interval (feet)	PID (ppm)	REMARKS
0	SP		SAND: Dark brown.		0.0	Work Area = 0.0 ppm
3	CL		CLAY: Grey, Hit refusal at 6'.	3'-6'	0.0	
6						E.O.B. @ 6 feet bgs

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LOG OF BORING SCS-067

Ten Mile Drain #2 Site
St Clair Shores, Michigan
W.O.#20083.066.001.0010

Location	*: St Clair Shores, MI*	*Checked By*	*: Erik Martinson*
Date	: 05/24/2005		
Drilling Method	: Geoprobe		
Driller	: U.S. EPA		
Logger	: Keith Lesniak/U.S. EPA		

Depth in feet	USCS	GRAPHIC	DESCRIPTION	Sample Interval (feet)	PID (ppm)	REMARKS
0	AR		CONCRETE:			Work Area = 0.0 ppm
1	SP		SAND: Light brown.		0.0	
3	SP		SAND: Light brown.		0.0	
6	SP		SAND: Light brown, Trace gravels from 8.5'-9'.		0.0	
9	SP		SAND: Brown, Wet, Trace small gravels.		0.0	
12	CL		CLAY: Grey, Wet, Trace small gravels.	12'-15'	0.0	
15						E.O.B. @ 15 feet bgs
16						
17						
18						

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USEPA

LOG OF BORING SCS-068

Ten Mile Drain #2 Site
St Clair Shores, Michigan
W.O.#20083.066.001.0010

Location	: St Clair Shores, MI	Checked By	: Erik Martinson
Date	: 05/24/2005		
Drilling Method	: Geoprobe		
Driller	: U.S. EPA		
Logger	: Keith Lesniak/U.S. EPA		

Depth in feet	USCS	GRAPHIC	DESCRIPTION	Sample Interval (feet)	PID (ppm)	REMARKS
0	AR		CONCRETE:			Work Area = 0.0 ppm
1	SP		*SAND: Brown.*		0.0	
3	SP		SAND: Brown.	3'-6'	0.0	
6	SP		SAND: Light brown, Trace small gravels from 7'-9'.		0.0	
9	SP		SAND: Trace small gravels.		0.0	
12	CL		CLAY: Grey, Wet.		0.0	
15						E.O.B. @ 15 feet bgs
16						
17						
18						

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USEPA	LOG OF BORING SCS-069 (Page 1 of 1)

Ten Mile Drain #2 Site
St Clair Shores, Michigan
W.O.#20083.066.001.0010

Location	: St Clair Shores, MI	Checked By	: Erik Martinson
Date	: 05/24/2005		
Drilling Method	: Geoprobe		
Driller	: U.S. EPA		
Logger	: Keith Lesniak/U.S. EPA		

Depth in feet	USCS	GRAPHIC	DESCRIPTION	Sample Interval (feet)	PID (ppm)	REMARKS
0	AR		CONCRETE:			Work Area = 0.0 ppm
1	SP		SAND: Light brown.		0.0	
3	SP		SAND: Light brown.		0.0	
6	SP		SAND: Light brown.		0.0	
9	SP		SAND: Light brown, Wet.	9'-12'	0.0	
12	SP		SAND: Brown.			
13	CL		CLAY: Grey, Wet.	12'-15'	0.0	Sand/Clay interface sampled.
15						E.O.B. @ 15 feet bgs
16						
17						
18						

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USEPA	LOG OF BORING SCS-070 (Page 1 of 1)

Ten Mile Drain #2 Site
St Clair Shores, Michigan
W.O.#20083.066.001.0010

Location	: St Clair Shores, MI	Checked By	: Erik Martinson
Date	: 05/25/2005		
Drilling Method	: Geoprobe		
Driller	: U.S. EPA		
Logger	: Keith Lesniak/U.S. EPA		

Depth in feet	USCS	GRAPHIC	DESCRIPTION	Sample Interval (feet)	PID (ppm)	REMARKS
0	AR		CONCRETE:			
1	SP		SAND: Dark.		0.0	Work Area = 0.0 ppm
3	CL		CLAY: Grey.		0.0	
6	CL		CLAY: Grey, Hit refusal at 9'.		0.0	
9						E.O.B. @ 9 feet bgs
10						
11						
12						

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USEPA	LOG OF BORING SCS-071 (Page 1 of 1)

Ten Mile Drain #2 Site
St Clair Shores, Michigan
W.O.#20083.066.001.0010

Location	: St Clair Shores, MI	Checked By	: Erik Martinson
Date	: 05/25/2005		
Drilling Method	: Geoprobe		
Driller	: U.S. EPA		
Logger	: Keith Lesniak/U.S. EPA		

Depth in feet	USCS	GRAPHIC	DESCRIPTION	Sample Interval (feet)	PID (ppm)	REMARKS
0	AR		CONCRETE:			
1	CL		CLAY: Grey.		0.0	Work Area = 0.0 ppm
3	CL		CLAY: Grey,		0.0	
6	CL		CLAY: Grey/light brown.		0.0	
9	CL		CLAY: Grey, Hit refusal at 12'.		0.0	
12						E.O.B. @ 12 feet bgs
13						
14						
15						

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LOG OF BORING SCS-072

Ten Mile Drain #2 Site
St Clair Shores, Michigan
W.O.#20083.066.001.0010

Location	: St Clair Shores, MI	Checked By	: Erik Martinson
Date	: 05/25/2005		
Drilling Method	: Geoprobe		
Driller	: U.S. EPA		
Logger	: Keith Lesniak/U.S. EPA		

Depth in feet	USCS	GRAPHIC	DESCRIPTION	Sample Interval (feet)	PID (ppm)	REMARKS
0	AR		CONCRETE:			
1	CL		CLAY: Grey/Dark brown, Sandy.		0.0	Work Area = 0.0 ppm
3	CL		CLAY: Dark grey from 3'-4', Light grey from 4'-6'.		0.0	
6	CL		CLAY: Grey, Hit refusal at 9'.		0.0	
9						E.O.B. @ 9 feet bgs
10						
11						
12						

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USEPA	LOG OF BORING SCS-074 (Page 1 of 1)

Ten Mile Drain #2 Site
St Clair Shores, Michigan
W.O.#20083.066.001.0010

Location : St Clair Shores, MI
Date : 05/25/2005
Drilling Method : Geoprobe
Driller : U.S. EPA
Logger : Keith Lesniak/U.S. EPA
Checked By : Erik Martinson

Depth in feet	USCS	GRAPHIC	DESCRIPTION	Sample Interval (feet)	PID (ppm)	REMARKS
0	AR		CONCRETE:			
1	CL		CLAY: Dark grey.		0.0	Work Area = 0.0 ppm
3	CL		CLAY: Brown.		0.0	
6	CL		CLAY: Brown, Hit refusal at 9'.		0.0	
9						E.O.B. @ 9 feet bgs
10						
11						
12						

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USEPA	LOG OF BORING SCS-075 (Page 1 of 1)

Ten Mile Drain #2 Site
St Clair Shores, Michigan
W.O.#20083.066.001.0010

Location	: St Clair Shores, MI	Checked By	: Erik Martinson
Date	: 05/25/2005		
Drilling Method	: Geoprobe		
Driller	: U.S. EPA		
Logger	: Keith Lesniak/U.S. EPA		

Depth in feet	USCS	GRAPHIC	DESCRIPTION	Sample Interval (feet)	PID (ppm)	REMARKS
0	AR		CONCRETE:			
1	CL		CLAY: Grey.		0.0	Work Area = 0.0 ppm
3	CL		CLAY: Brown, Trace gravels.		0.0	
6	CL		CLAY: Brown, Hit refusal at 9'.		0.0	
9						E.O.B. @ 9 feet bgs
10						
11						
12						

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USEPA	LOG OF BORING SCS-076 (Page 1 of 1)

Ten Mile Drain #2 Site
St Clair Shores, Michigan
W.O.#20083.066.001.0010

Location	: St Clair Shores, MI	Checked By	: Erik Martinson
Date	: 05/25/2005		
Drilling Method	: Geoprobe		
Driller	: U.S. EPA		
Logger	: Keith Lesniak/U.S. EPA		

Depth in feet	USCS	GRAPHIC	DESCRIPTION	Sample Interval (feet)	PID (ppm)	REMARKS
0	AR		CONCRETE:			
1	CL		CLAY: Grey/Light brown.		0.0	Work Area = 0.0 ppm
3	CL		CLAY: Light brown/Grey.		0.0	
6	CL		CLAY: Light brown, Trace gravels, Hit refusal at 9'.		0.0	
9						E.O.B. @ 9 feet bgs
10						
11						
12						

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USEPA

LOG OF BORING SCS-077

Ten Mile Drain #2 Site
St Clair Shores, Michigan
W.O.#20083.066.001.0010

Location	: St Clair Shores, MI	Checked By	: Erik Martinson
Date	: 05/25/2005		
Drilling Method	: Geoprobe		
Driller	: U.S. EPA		
Logger	: Keith Lesniak/U.S. EPA		

Depth in feet	USCS	GRAPHIC	DESCRIPTION	Sample Interval (feet)	PID (ppm)	REMARKS
0	AR		CONCRETE:			
1	CL		CLAY: Light brown.		0.0	Work Area = 0.0 ppm
3	CL		CLAY: Brown.		0.0	
6	CL		CLAY: Brown.	6'-9'	0.0	
9	CL		CLAY: Brown, Hit refusal at 12'.	9'-12'	0.0	
12						E.O.B. @ 12 feet bgs
13						
14						
15						

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USEPA	LOG OF BORING SCS-078 (Page 1 of 1)

Ten Mile Drain #2 Site
St Clair Shores, Michigan
W.O.#20083.066.001.0010

Location	: St Clair Shores, MI	Checked By	: Erik Martinson
Date	: 05/25/2005		
Drilling Method	: Geoprobe		
Driller	: U.S. EPA		
Logger	: Keith Lesniak/U.S. EPA		

Depth in feet	USCS	GRAPHIC	DESCRIPTION	Sample Interval (feet)	PID (ppm)	REMARKS
0	AR		CONCRETE:			
1	SP		SAND: Light brown.		0.0	Work Area = 0.0 ppm
2	CL		CLAY: Grey.			
3	SP		SAND: Light brown.			
4					0.0	
5						
6	CL		CLAY: Grey, wet.			
7				6'-9'	0.0	
8						
9	CL		CLAY:			
10				9'-12'	0.0	
11	SP		SAND: Brown, Wet.			
12	SP		SAND: Brown, Wet.			
13				12'-15'	0.0	
14	CL		CLAY: Grey, Wet.			
15	CL		CLAY: Grey, Wet.			
16					0.0	
17						
18	CL		CLAY: Grey, Wet.			
19				18'-20'	0.0	
20						E.O.B. @ 20 feet bgs
21						
22						

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USEPA	LOG OF BORING SCS-079 (Page 1 of 1)

Ten Mile Drain #2 Site
St Clair Shores, Michigan
W.O.#20083.066.001.0010

Location	: St Clair Shores, MI	Checked By	: Erik Martinson
Date	: 05/25/2005		
Drilling Method	: Geoprobe		
Driller	: U.S. EPA		
Logger	: Keith Lesniak/U.S. EPA		

Depth in feet	USCS	GRAPHIC	DESCRIPTION	Sample Interval (feet)	PID (ppm)	REMARKS
0	AR		CONCRETE:			
1	SP		SAND: Dark brown.		0.0	Work Area = 0.0 ppm
2						
3	SP		SAND: Brown.			
4	CL		CLAY: Grey.		0.0	
5	SP		SAND: Light brown.			
6	CL		CLAY: Light grey/brown, Wet, Sandy and Light brown at 9'.			
7					0.0	
8						
9	SP		SAND: Light brown, Wet.			
10				9'-12'	0.0	
11						
12	SP		SAND: Dark grey, Wet.			
13				12'-15'	0.0	
14	CL		CLAY: Light grey, Wet.			
15	CL		CLAY: Grey, Wet, Silty.			
16					0.0	
17						
18						E.O.B. @ 18 feet bgs
19						
20						

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USEPA

LOG OF BORING SCS-080

Ten Mile Drain #2 Site
St Clair Shores, Michigan
W.O.#20083.066.001.0010

Location	: St Clair Shores, MI	Checked By	: Erik Martinson
Date	: 05/25/2005		
Drilling Method	: Geoprobe		
Driller	: U.S. EPA		
Logger	: Keith Lesniak/U.S. EPA		

Depth in feet	USCS	GRAPHIC	DESCRIPTION	Sample Interval (feet)	PID (ppm)	REMARKS
0	AR		CONCRETE:			Work Area = 0.0 ppm
1	SP		SAND: Light brown.		0.0	
3	SP		SAND: Light brown.		0.0	
6	SP		SAND: Light brown.		0.0	
9	SP		SAND: Light brown, Trace small gravels from 10'-11'.	9'-12'	0.0	
11	CL		CLAY: Grey.			
12	CL		CLAY: Grey, Wet, Silty.		0.0	
15						E.O.B. @ 15 feet bgs
16						
17						
18						

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USEPA

LOG OF BORING SCS-081

Ten Mile Drain #2 Site
St Clair Shores, Michigan
W.O.#20083.066.001.0010

Location	: St Clair Shores, MI	Checked By	: Erik Martinson
Date	: 05/25/2005		
Drilling Method	: Geoprobe		
Driller	: U.S. EPA		
Logger	: Keith Lesniak/U.S. EPA		

Depth in feet	USCS	GRAPHIC	DESCRIPTION	Sample Interval (feet)	PID (ppm)	REMARKS
0	AR		CONCRETE:			Work Area = 0.0 ppm
1	CL		CLAY: Grey.		0.0	
3	CL		CLAY: Light brown, Trace small gravels.		0.0	
6			No sample collected from Geoprobe.		0.0	
9			No sample collected from Geoprobe.		0.0	
12			No sample collected from Geoprobe.		0.0	
15						E.O.B. @ 15 feet bgs
16						
17						
18						

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USEPA	LOG OF BORING SCS-082 (Page 1 of 1)

Ten Mile Drain #2 Site
St Clair Shores, Michigan
W.O.#20083.066.001.0010

Location	: St Clair Shores, MI	Checked By	: Erik Martinson
Date	: 05/25/2005		
Drilling Method	: Geoprobe		
Driller	: U.S. EPA		
Logger	: Keith Lesniak/U.S. EPA		

Depth in feet	USCS	GRAPHIC	DESCRIPTION	Sample Interval (feet)	PID (ppm)	REMARKS
0	AR		CONCRETE:			Work Area = 0.0 ppm
1	SP		SAND: Light.		0.0	
3	SP		SAND: Light brown.			
4	CL		CLAY: Grey.	3'-6'	0.0	
6	CL		CLAY: Grey/Brown, Wet.		0.0	
9	CL		CLAY: Grey/Brown, Silty.		0.0	
12	SP		SAND: Brown, Wet.	12'-13'	0.0	
13	CL		CLAY: Grey, Wet.			
15						E.O.B. @ 15 feet bgs
16						
17						
18						

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USEPA

LOG OF BORING SCS-083

Ten Mile Drain #2 Site
St Clair Shores, Michigan
W.O.#20083.066.001.0010

Location	: St Clair Shores, MI	Checked By	: Erik Martinson
Date	: 05/26/2005		
Drilling Method	: Geoprobe		
Driller	: U.S. EPA		
Logger	: Keith Lesniak/U.S. EPA		

Depth in feet	USCS	GRAPHIC	DESCRIPTION	Sample Interval (feet)	PID (ppm)	REMARKS
0	AR		CONCRETE:			
1	SP		SAND: Light brown.		0.0	Work Area = 0.0 ppm
3	SP		SAND: Light brown.	3'-6'	0.0	
6	SP		SAND: Light brown, Wet.	6'-9'	0.0	
9	SC		SAND: Dark grey, Wet.			
10	CL		CLAY: Grey, Wet.	9'-12'	0.0	*Sampled soil at the sand/clay interface.*
12						E.O.B. @ 12 feet bgs
13						
14						
15						

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USEPA

LOG OF BORING SCS-084

Ten Mile Drain #2 Site
St Clair Shores, Michigan
W.O.#20083.066.001.0010

Location	: St Clair Shores, MI	Checked By	: Erik Martinson
Date	: 05/26/2005		
Drilling Method	: Geoprobe		
Driller	: U.S. EPA		
Logger	: Keith Lesniak/U.S. EPA		

Depth in feet	USCS	GRAPHIC	DESCRIPTION	Sample Interval (feet)	PID (ppm)	REMARKS
0–1	AR		CONCRETE:		0.0	Work Area = 0.0 ppm
2	SP		SAND: Light brown.			
3–6	SP		SAND: Light brown and wet from 3'-5', Light and dark brown from 5'-6'.	3'-6'	0.0	
6–9	SP		SAND: Brown and wet from 6'-8', Dark grey and wet from 8'-9'.	6'-9'	0.0	
9–12	SP		SAND: Grey and wet from 9'-11', Very dark from 11'-12'.	9'-12'	0.0	
12			ORGANICS: Wood piece stuck in Geoprobe, no sample.		0.0	

E.O.B. @ 15 feet bgs

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USEPA

LOG OF BORING SCS-085

Ten Mile Drain #2 Site
St Clair Shores, Michigan
W.O.#20083.066.001.0010

Location	: St Clair Shores, MI	Checked By	: Erik Martinson
Date	: 05/26/2005		
Drilling Method	: Geoprobe		
Driller	: U.S. EPA		
Logger	: Keith Lesniak/U.S. EPA		

Depth in feet	USCS	GRAPHIC	DESCRIPTION	Sample Interval (feet)	PID (ppm)	REMARKS
0	AR		CONCRETE:		0.0	Work Area = 0.0 ppm
2	SP		SAND: Light brown.			
3	SP		SAND: Brown, wet.	3'-6'	0.0	
6	SP		SAND: Dark grey and wet from 6'-7', Light brown and wet from 7'-8', Grey and wet from 8'-9'.	6'-9'	0.0	
9	SP		SAND: Grey, Wet.			
10	CL		CLAY: Grey, Wet.	9'-12'	0.0	
12	SP		SAND: Grey, wet.	12'-15'	0.0	
15						E.O.B. @ 15 feet bgs
16						
17						

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APPENDIX B

MDEQ – GPR And EM Survey Report

MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY

INTEROFFICE COMMUNICATION

TO: Richard Berak, Project Manager, Southeast Michigan District Office
Remediation and Redevelopment Division

FROM: Tom Mann, Geologist Specialist, Geological Services Unit
Remediation and Redevelopment Division

DATE: September 6, 2005

SUBJECT: 10 Mile and Martin Drain, Macomb County, MERA #500736
Ground Penetrating Radar & Electromagnetic Surveys

Richard Berak of the Remediation and Redevelopment Division's (RRD's) Southeast Michigan District Office, requested RRD's Geological Services Unit (GSU) use Ground Penetrating Radar (GPR) to find where the former Martin Drain met Bon Brae and Lakeland Roads. The drain is located in Section 22, T1N-R13E, Macomb County, Michigan.

The GSU conducted a GPR Survey on April 4, 2005. GPR utilizes pulses of electromagnetic energy like marine sonar or a fish finder. An antenna transmits pulses of electromagnetic energy into the ground. Interfaces between layers reflect some of the energy. The antenna receives the reflected signal and the instrument records it as a function of time on the vertical scale of a graphic record. Travel time of the signal is relative to the depth of the reflector. Pulling the antenna over the ground and sequentially plotting the reflected pulses, gives a cross-sectional profile of subsurface conditions.

Poor radar response from clay soils in the suspected areas, along with multiple utility service line trenches, made it difficult to distinguish the former drain. GSU staff sampled location MSB-13 based upon the radar data. In retrospect, the location likely was the gutter of the former D Street.

After St. Clair Shores obtained more complete access to property that the Martin Drain formerly occupied, Richard Berak made a second request for GSU staff to locate the drain for sampling. ETC Consultants also provided a 1964 aerial photo of the drain (Fig 1).

The GSU conducted an Electromagnetic survey with a Geonics EM-31 in May 2005 in the concourse area between Bon Brae and Bon Heur. Electromagnetic surveys provide a means of measuring the electrical conductivity of subsurface soils, rock, and groundwater. Electrical conductivity is a function of the soil type, porosity, permeability, and pore fluid. The pore fluid will usually be the dominant conductor. It is also useful for the detection of conductive metals.

The EM-31 induces electrical currents in the ground. An alternating current passed through a transmitting coil, generates a primary oscillating magnetic field. This induces alternating electrical currents in the subsurface conductive materials that generate a secondary magnetic field. This secondary magnetic field is measured with a receiver coil.

The secondary magnetic field differs in phase from the primary field. The EM-31 measures two components of the secondary field. The quadrature component is 90 degrees out of phase and the in-phase component 180 degrees out of phase. The quadrature component of the secondary magnetic field is proportional to the ground conductivity (Fig 2). Many contaminants will produce a change in the amount of free ions in the soils or groundwater. Changes in the ion levels change the ability of the soil or water to conduct electrical current. This change stands out as an anomalous high or low value when compared to background readings. In the presence of a very good conductor, the quadrature component will reverse and have negative values. This is a good indication of a significant amount of buried metal. Theoretically, better conductors increase the magnitude of the in-phase component (Fig 3) making it more sensitive to metals than the quadrature component. Practical interpretation of the in-phase component is more complex. Where the horizontal extent of the conductor exceeds the transmitter receiver spacing of the EM-31, the response is typically a high positive. When the horizontal extent of the conductor is less than the transmitter-receiver spacing of the EM-31, the response can vary. Some possible results are double negative peaks or a negative peak flanked by positive peaks.

If the drain was filled with a material that is different than the native clay soil, the EM ground conductivity results would have picked up a contrast. The ground conductivity results do not show a contrast indicating that the drain was backfilled with clay. The In-phase results do show an area of buried metal under the former C Street that most likely is the culvert for the former drain. GSU staff ran a GPR line over the end of the culvert (Fig 4). The ditch is faintly visible with the culvert at the bottom as indicated. GSU sampling staff acquired sample SCS030 in this location.

The GSU staff registered and rectified the 1964 aerial photo with control points that still exist and digitized the drain. They then uploaded the digitized Martin Drain segments to a Global Positioning System (GPS) with a reported accuracy of one meter. GSU staff checked the GPS position of the drain in the field with the culvert that was detected in the EM survey. It was within the reported accuracy of the unit. GSU staff used the GPS to locate the drain for sampling at SCS031, SCS034, SCS035, and SCS036 locations. Sampling staff later recorded the Martin Drain sample locations on a GPS with a reported accuracy of three meters. These sample locations and digitized Martin Drain are illustrated on a 2002 aerial photo in Figure 5.

If you have any questions, please contact me at 517-335-6425.

Attachments

cc: P. Shirey, RRD
Joe Victory, Weston Solutions ✓

Tom Mann

APPENDIX C

Analytical Data

(VOLUME II)